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OF

FORESTRY,

AGRICULTURE, SHIKAR & TRAVEL.

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X

THE

INDIAN FORESTER.

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FOREST CONSERVANCY IN BOMBAY.

We give the leading article from the *Bombay Gazette* and "Bhugut's" letter, which gave rise to it, in full :—

"Last mail brought news of Mr. Slagg having interpellated the Under-Secretary of State for India on the 28th April as to whether the recent policy of the Bombay Government to appropriate as 'protected forest' about 1,000 square miles of wooded land in the Tanna district, had not caused serious discontent among nearly a million of people 'whose trade and agricultural and domestic necessities had been seriously affected thereby,' and whether Mr. Cross could give or would obtain information as to the reasons which were held to justify the action of Government. Mr. Cross in reply had to confess that the 'enforcement during the last 15 or 20 years of these restrictions has caused some discontent.' It is perhaps to be regretted that Mr. Slagg did not mark his appreciation of the meagre information vouchsafed by the Under-Secretary, by a motion for laying the entire correspondence on the subject on the table of the House. As it is, the impression made upon the mind of the House by the off-hand admission that 'some' discontent had been caused by the present working of the forest rules, could not but have been of a very fleeting character. In the absence of the official papers, the public has to rely upon such facts as are supplied through non-official channels.

"We invite attention to a very important letter, given in another column, from 'Bhugut,' putting forward 'A plea for the Forest Tribes.' From the statistics given he shows that the question of the scientific forest conservancy affects nearly two millions of people in the Bombay Presidency, and he warns us that if their grievances are not carefully taken into account by Government, 'they will be apt, sooner or later, to assert their rights, or what they consider to be their rights, in a very awkward and indiscriminate fashion.' One thing to be noted in regard to these tribes is that they have been denizens of forests from times which date as far back as the conquest of India by the Aryans. These non-Aryan classes were driven to the mountain fastnesses of India as the Aryan conquerors overspread the country. There they remained unmolested for centuries, though the country was submerged by successive waves of conquest, from the Hindu to the Afghan, from the Afghan to the Mogul, from the Mogul to the Maratha, and from the Maratha to the British. They were left there in the undisturbed possession of the lordship of the

jungles, and their rights to the free use of its produce. Our correspondent gives a sketch of the habits and modes of life of the tribes, and of the hardships to which they have been subjected by the working of the rules under the Forest Act. Those who are in doubt about the reality of the grievances of these wandering tribelets cannot fail to observe the significance of the growing friction between Forest Conservators and Collectors in the districts, as evidenced in the last administration report of the Forest Department for 1883-84. We find, for instance, that under the authority of Government Resolution No. 5977 of 12th November, 1880, the District Collector is empowered to make free grants of timber to poor people whose houses have been destroyed by fire or floods. Under the orders of the Collector, the mamlatdars have the power of making such grants. The complaint of the Forest Department is that, under existing arrangements, these free grants are not made on a just principle. Lieutenant-Colonel McRae, the Conservator of Forests, Northern Circle, remarks that 'the Department that 'enjoys the privilege of making the free grants, and gets credit for them in the goodwill of the people, is not the custodian of the material given away, bears none of the disagreeables connected with making them, and is put to no expense by them.' He accordingly says that it would be more appropriate if applications for free grants of timber were made in the first instance to the officers of the Forest Department. Upon this Mr. E. P. Robertson, the Commissioner, C. D., remarks:—

"I must take objection to Colonel McRae's remark that under existing arrangements the free grants of timber are not made on a just principle. It is clear that the Forest Department, who have their own duties to attend to, cannot properly judge who are the indigent people whose houses have been destroyed by fire or by floods, who should be relieved by grants of timber. It is only the Revenue officers who can secure the necessary information, and to obtain such information often requires no small amount of inquiry as to the facts of each case and the circumstances of the people in question.' Mr. Sheppard, Commissioner, N. D., while admitting the necessity of increased liberality in the mode of making free grants of timber, observes:—'I am not able to believe that in jungle districts the Forest Department, however strong, can guard the interests of Government as effectually as the people can, and more should be done to conciliate them, and to make the Department less unpopular.'

"The present unpopularity of the Forest Department is thus admitted, and indeed it would be useless to ignore it. The plea put forward by our correspondent deserves very anxious consideration. We are so convinced of the value—indeed of the indispensable necessity—of forests, that any merely captious or exaggerated criticism of the process essential to their existence and restoration would receive no sympathy at our hands. But there is such a general agreement amongst disinterested on-lookers that the rules are enforced to the serious detriment of large numbers of the population, that it is impossible to resist the conviction that the time has come to make a thorough inquiry with a view to ascertain how the imprescriptible rights of the wild tribes who dwell in the jungles, and of the villagers who are settled on their outskirts, can be reconciled with the conservation of the forests. It is the impression of careful observers that

much of the hard-and-fast application of strict rules which gives rise to a sense of injury and oppression, is due to the numerical inadequacy of the staff of the Forest Department. A great deal of mischief certainly arises from the disproportion between the thousands of square miles to be overlooked and administered, and the mere handful of officers who are charged with the duty. For one thing, the forests, in spite of the harshness of the enforcement of rules in certain areas, are very badly protected taking them all round. In some localities the lopping of a twig entails exemplary punishment, but in others trees are felled with impunity, and consequently with recklessness. If the headmen of the villages were led to understand that it would be for the eventual advantage of the villagers, and for their own immediate advantage, to take some pains to allow the young trees to grow, and prevent waste and mischief, a very efficient staff of guardians of forest rights might be trained up. Surely it cannot be beyond the resources of administrative skill to bring the patels to look at the matter from this point of view. The forest produce, which is of little or no intrinsic value to Government, should be freely given to those whose traditional property it is; the chief condition insisted upon being that growing trees should not be injured, or made away with."

A Plea for the Forest Tribes.

To the Editor of the "Bombay Gazette."

"Sir,—We have read a good deal lately in your columns about the rights and wrongs of the forest tribes in connection with the brand-new system of scientific forest conservancy which the Government are now laboriously attempting to introduce in various parts of this Presidency; but few persons appear to have any correct idea of the extreme magnitude and importance of the subject in its bearing on the interests of the forest tribes and general population of the country. Of whom, then, do these forest tribes consist, and what are their approximate numbers? Full information on both points will be found by all who seek for information in Mr. Campbell's admirable 'Gazetteer,' and in Mr. Baine's 'Census Report of 1881.' Mr. Campbell's account of the forest tribes under each district head contains I think, all that most persons will care to read, and all at any rate that is essential to be known on the subject; and the following figures, taken from Mr. Baine's 'Census Report of 1881,' will give some idea of the numbers of the chief forest and aboriginal tribes which inhabit the hills and mountain ranges in various parts of the Presidency:—

Bhil,	...	...	...	3,47,220
Varly,	...	...	...	69,534
Kathodi or Katkari,		...	...	51,283
Thakur,	...	...	...	64,739
Dubla,	...	...	...	10,883
Chodra,	...	...	...	34,465
Dhodia,	...	...	...	58,879
Naikada,	...	...	...	26,289
Dhangar,	...	...	...	10,584
		Total,	...	6,73,876

"Many minor castes, such as Gamtas, Chor Patils, Wagris, &c., add to the general population of the forest tribes, and no account has been taken of the extremely numerous class of Mahars and Kolis—both Ghati and Konkani—which form a very important element in forest villages, and which are, as regards their habits and occupation, practically undistinguishable from the aboriginal tribes. The Mahars alone are estimated to amount to 2,52,523, while the Ghati Kolis are reckoned at 8,44,146, the Konkani Kolis at 1,20,006, and the miscellaneous Kolis—exclusive of ten Talabdas of Gujerat—at 1,17,397.

This, then, is the vast community which has a deep, nay a vital, interest in what is euphemistically called by some conservancy, by others confiscation, of the forests. Though ordinarily dumb and inarticulate, a community as numerous and as prolific as this cannot well be overlooked in connection with any scheme of scientific forestry; and if the forest tribes be not carefully taken into account they will be apt, sooner or later, to assert their rights, or what they consider to be their rights, in a very awkward and indiscriminating fashion. These forest tribes and early races have from time immemorial taken up their habitation in the hills. The ghats and upland fastnesses are their natural home; and amidst all the dynastic changes of many centuries the lordship of the jungles they have hitherto held unquestioned with the tiger and the bear. Averse to settled industry in any shape, they lead a nomadic and precarious existence. Their mode of tillage, locally known as Koomri and Dahli, is of the roughest and most wasteful kind. They strip a hillside in order to raise a few middling crops of nachni and vari; and their faith in rab or wood ash manure is at once childlike and grand. Wood-cutters and charcoal-burners by hereditary right, these tribes have hitherto filled an important and well-recognised place in the social economy. They have always supplemented their scanty earnings by vending to the community various edible kinds of fruits and roots, the leaves of the palas and apta, honey, gum, and divers other articles of a similar character. Forest produce of this kind was the natural heritage of the jungle tribes who collected it, often with much toil and labor, and always under conditions that gave them a clear right to the profits of their own industry. They not only collected but distributed these products, and were in fact the only agency by which the demands of the local market could ordinarily be supplied.

"Armed with bow and arrow or light bamboo spear, many of them are great hunters, and they are not at all particular about what they eat. They worship the brab and cocoanut palm, which supplies them with toddy juice, which they regard as veritable meat and drink. When fresh they find the juice a wholesome and pleasant stimulant, and to a half-starved people an invaluable substitute for food. Formented, the juice is universally esteemed as a febrifuge. It enables the jungle tribes to defy with impunity the deadly malaria of the valleys and the water springs choked with poisonous vegetation. A prophylactic against sickness, a universal remedy against all jungle ailments, a god-given food—the fermented juice of the toddy-tree is regarded by the jungle tribes as one of Vishnu's greatest gifts; and the intoxication which so excites our modern British Pharisee—for intoxication is of course unknown in England—may be readily condoned in the case of half-savage races which advancing civilisation has proscribed,

and which are compelled to wage for bare existence a constant and unequal struggle with all the perils of the hills and woods, perils of air and perils of water, perils of men and perils of beasts, perils of hunger, sickness, and death.

"Clothes they wear of the scantiest. A rag or string round the loins; a necklace of beads; and hair tied up in a knot; eyes blood-shot; lineaments pinched and worn, telling of many a hard struggle with hunger and thirst, heat and cold, fever and small-pox; puny of stature, and as a rule hideously ill-favoured, these wild men of the woods present at once an interesting study, and an important problem to the philosopher and the statesman. What is to be done with them; how are they to be employed; how can they be made useful members of society? This is the manner of man upon whom the new forest rules have fallen like a fatal blight—like a thunderbolt from a clear sky. By one direful stroke of the pen he finds himself at once a proscribed outcast in his own wilds. His hills and jungle fastnesses are suddenly proclaimed to be State forests. Every vegetable and mineral substance therein is declared to be 'forest produce.' All forest produce is declared to belong to the Crown. And no one is allowed to move any forest produce whatever without the formal permission of the 'jungle-walla sahib,' the new forest king. The new king, moreover, is no *roi fanéant*, but a terrible white man, a typical sahib, painfully in earnest, sworn to protect every green tree, a deadly foe to every black man armed with the axe. Does a wretched Varli scratch clean half an acre of slope and cover it with a layer of bushes and scrub, all ready to burn—down comes the forest guard and arrests him for committing waste! Does he lop a kheir or an ain tree, or any of the hundred and one kinds specially reserved—away with him to the magistrate for injuring Crown property! Does he cut a few reeds for his hut, or bamboos for his cattle shed—he is a thief (God save the mark), he has stolen public property! Does he carry to the nearest bazaar a few common rafters for sale—he has taken what does not belong to him, he has no permit, he must forfeit them! Does he collect for his own use a little store of mowhra flowers, or korinda berries, or nuts, or edible roots, or what not,—poor fool, he little knows that he is committing a crime, that mowhra flowers and all other forest produce are no longer his, that they are all put up by contract to the highest bidder, and that all property in them is transferred to the neighbouring Parsee or Hindu contractor! Of course he is 'fully informed'—(this phrase has now become classical)—that all this is done for his own good, that the mowhra belongs to the Queen, that illicit distillation must be stopped, that intoxication is a great sin which cannot be allowed under a moral British raj, &c., &c. Admirable and excellent reasons to Mr. Conservator Jones, but not, I fear, equally convincing to poor Rama Bhil, who points to his pinched stomach and thinks ruefully how the wolf is to be kept from the door. It is believed to be a moot point whether snakes and jungle fever are or are not 'forest produce' within the meaning of the Act. The Advocate-General is believed to have once expressed the opinion that the term 'forest produce' for the purposes of the Forest Department includes everything in a forest which might under any conceivable circumstances be turned to pecuniary account. It may fairly then be argued that if any poor Bhil were to make a

profit out of catching snakes or curing jungle fever he might fairly be prosecuted for attempting to appropriate forest dues which clearly belong to our energetic and omnivorous Conservator.

"Now, Sir, I do not question for a moment the excellent motives of the Government and its officers in seeking to protect the forests and to reclothe the barren hill slopes; but the question I have to ask you is simply this—What on earth are these poor wretched forest tribes to do under the present system? They are forbidden to cultivate for fear of spoiling the forests. They are deprived of all honest employment whatever. They are absolutely forbidden to cut on their own account any green thing. And all forest produce is declared to belong to the Crown. I say again, what on earth are they to do? Surely it needs no great penetration to see that the situation is a clear *impasse*, a deadlock, an official *cul de sac*, and one that must lead to very serious consequences if powerful and effectual remedies be not applied.

"It is not too much to say that under the present *régime* of so-called scientific conservancy the treatment of these unfortunate forest tribes has been simply scandalous. They have been of late years systematically treated as though they were outcasts from society, and had no rights whatever, certainly none that can be pleaded against the all-powerful Ráj Sirkar. Thousands are said to have emigrated to the neighbouring Native States to avoid the oppressive treatment to which they are now subjected in British territory; but unfortunately even there the ubiquitous Government official is able to pursue them, and bitter complaint is made that pressure is now habitually brought to bear on Native States to oblige them to adopt the very system which is doing so much injury in British territory. Where, I ask, is this wonderful and ever-widening circle of oppression to end?

"If it be necessary to ruin the forest tribes in British territory by converting into State forest every acre of unoccupied land that the Forest Department can seize, by prohibiting all cultivation in forest limits, by expelling the villagers from their homes, by appropriating the mowhra, by placing an embargo on toddy, by claiming as Crown property everything that grows or is produced on God's earth—why, Sir, I ask is it necessary to extend this iniquitous and outrageous system to the neighbouring Native States, which are gradually coming to be regarded as havens of refuge against British oppression.

"Now, this story, strange as it may seem, and bad as it is, is unhappily no new story. The main features of it have been for many years past a stock subject of controversy between the forest officials and district officers, and have been more than once brought into public notice—notably in an able paper entitled 'Persecution in the Western Ghâts,' by a well-known member of the Bombay Civil Service, in the pages of the *Calcutta Review*. But as long as Government are pleased to place their conscience in the keeping of the Forest and Abkari Departments, so long there is very great fear, nay certainty, that these miserable forest tribes will go to the wall.

"The letters from forest officers recently published in your columns clearly show the spirit in which this important question is regarded by the officials of the Forest Department. You will doubtless call to mind in this connection the extraordinary letter of 'Forests' which you published not very long ago. The next suggestion which appear-

ed was, if I remember right, one from a correspondent who called himself 'Viator,' who charitably expressed the view that the forest tribes were an anachronism and ought to be exterminated;—not, he was pleased to say, by fire and sword, but apparently by bag and baggage deportation from their own homes, while the young Bhils and Varlis he proposed to treat like young panther cubs, confine them in iron cages with a chain round their leg.

"While sentiments like these are freely advocated in the public press, and while the forest tribes are openly treated in the manner described in this letter, it is surely high time for some one to say a word on their behalf. These poor wretched devils have no *vates sacer*, no public or recognised protector to sing their griefs and joys and to urge their rights before these omnivorous and insatiable departments; but it may not be out of place occasionally to remember that Dublas and Varlis are God's creatures and British subjects, and are entitled, as such, to ordinary humanity and to common justice."

Thus according to the *Bombay Gazette*, great hardship exists among the forest tribes owing to the new conservancy rules now enforced in portions of the Bombay Presidency. Driven into their mountain homes by the Aryan invasion, these tribes are mostly aboriginal, and while successive waves of conquest have swept over Hindustan, they have peaceably remained in undisturbed possession of the jungle, and their rights to the free use of its produce. "Bhugut" takes up their tale of woe, and in picturesque language describes the treatment of these "poor wretched devils" as simply scandalous; he says that the situation is a deadlock, an official *cal de sac*, and one that must lead to serious consequences before long. The Forest Department appears to be exceedingly unpopular, and has arrayed against it the whole staff of the civil administrators of the country.

There is clearly something radically wrong when such things be, and we would ask some of our brethren in the Bombay Presidency to explain the circumstances more fully, and indeed to defend the serious charges brought against them. One cause of the mischief appears to be the numerical inadequacy of the staff of the Forest Department, the disproportion between the thousands of square miles to be overlooked and administered, and the mere handful of officers charged with this duty being so great as to render effective protection impossible; but it is probable that the application of hard-and-fast rules in a manner not always judicious is an important factor in the case. Who will enlighten us on the subject?

Several letters have appeared in the *Bombay Gazette* in answer to "Bhugut's" indictment, neither of them written by Forest officers. One signed "Fidelis" points out the probability of privileges granted to the forest tribes being abused, people living in trade centres receiving produce gratis under cover of passes, held by the tribes in the forest. He reminds his readers that the great difficulty in dealing with forest privileges is to

ensure the full enjoyment of the privileges by those for whose benefit alone they are granted, while preventing abuse by outsiders who have no claim to such consideration.

The other writer, "Decentraliser," cannot be said to throw much light on the discussion, but he makes one point, when he says that it is the very preservation of the forest tracts which gives these tribes their only means of subsistence, that were it not for the protection of these domains under the forest rules the advancing tide of civilisation would have sooner or later annihilated them. This is no doubt true if the land is capable of cultivation, and accessible; but if these forest tracts are situated, for instance, on trap hills similar to those found in the Central Provinces, then it would be many generations before the wave of civilisation would reach them.

Another letter by "Shams-ud-din," who is also not a Forest officer, asserts that "Bhugut" only deals with generalities, and misleads the public by making assertions which may be true concerning the Forest Department's treatment of a small section of the large forest population which he treats as a whole. We give the following extracts from "Shams-ud-din's" letter :—

"Mind, I do not admit that his statements are really accurate for any tribe or locality whatever. With a special knowledge of the desire and endeavours of Government always to conciliate the jungle tribes, I cannot believe in the wholesale confiscation of which 'Bhugut' writes. I know that over very large areas it has not been effected.

"In the second place, 'Bhugut,' confident in the knowledge that he is taking the fashionable side, shows a decided animus against the 'omnivorous department.' And, thirdly, 'Bhugut' is entirely wanting in imagination, in the faculty of putting himself in the wild man's place. Like Mr. Wilfred Blunt, he harps on the evidences among his clients of a very low standard of living.

* * * * * *

"I beg to say that I am not an officer of the Forest Department, and that in many respects its management appears to me, as to others, grasping, stingy, and faulty. But the criticisms that are passed upon it by people who will not take the trouble to master the difficulties of its task, besides being misleading and unfair, are likely to prove mischievous. Do you, Sir, or can anyone imagine that it is possible to introduce forest conservancy without creating a great deal of discontent. With the unrestricted use of the jungles a great many wasteful habits have been handed down to the people of to-day, not the wild tribes only. It is absolutely necessary in the interests of the country that these wasteful habits should be checked and confined in area. Some must be eradicated. Discontent there must inevitably be, and not of the wild tribes only. But in this, as in the mowhra controversy, they are a convenient peg on which to hang the agitation. My own observation leads me to the belief that the restrictions tell more hardly on the settled cultivators than on the wild tribes. The statement that the latter will be apt sooner or latter to assert what they

consider to be their rights in a very awkward and indiscriminating fashion covers a good large field. 'Bhugut' would consider it proved if they looted a Bania or knocked a Forest Guard on the head in a private quarrel. As a matter of fact, the wilder the people of Western India the easier they are to manage by the average Englishman fond of sport and with a kindly feeling for such as are poor and simple and ignorant. Of course in these days of constitutional agitation, and in a country where agitation, constitutional or other, is likely to be, and, if I mistake not, has been already, more than once, stirred up by people who keep themselves carefully under cover, the wild man may be utilised; but no spontaneous efforts to assert supposed rights need be feared as long as the forest and district officers exercise a little sympathetic care and tact, and are liberal in matters not essential to the growth of trees over the areas which Government may place in their hands after due deliberation."

"Shams-ud-din" has been replied to by "Jago," whose letter we reproduce:—

To the Editor of the "Bombay Gazette."

"SIR,—'Shams-ud-din,' in your issue of this morning, asks, 'Do you, Sir, or can any one, imagine that it is possible to introduce forest conservancy without creating a great deal of discontent?' and observes, 'With the unrestricted use of the jungles, a great many wasteful habits have been handed down to the people of to-day, not the wild tribes only. It is absolutely necessary, in the interests of the country, that these wasteful habits should be checked,' &c.

"This is always the strain of the apologists of high-handed or rough-shod forest conservancy; but can it bear a moment's scrutiny? 'Shams-ud-din' takes 'Bhugut' to task for his generalities; but what is the above but a string of similar generalities? If people with 'many wasteful habits' have had 'unrestricted use of the jungles' to this day, it is a wonder any forests were left and no fuel or wood famine was caused all this time, and in fact till the scientific 'forest kings' were recently installed. The fact is, that the Indian people, whether wild or civilised, have an instinctive desire for the preservation of their trees as much as their cows, consuming only the products in each case; and if this feeling is giving way to a desire to cut and chop as opportunity offers, it is because the new policy of 'conservation' leads them to apprehend that they will not be allowed the benefit of their abstinence as heretofore. And as no conservancy can succeed in the face of a whole people inspired with such a distrustful and hostile attitude, the radical conservators ought, in the interests of the very cause they profess so warmly to advance, to shape their policy on less hard-hearted lines.

"But it is 'in the interests of the country' that they demand a check in these wasteful habits. It is admitted, however, that the people have had an unrestricted use of the jungles these many centuries, and if so it is clear they have a right to some compensation. If the interests of the country demand the invasion of that right, they should furnish the needful compensation.

"For the rest I leave 'Bhugut' to deal with 'Shams-ud-din' as he thinks best."

What we wish to see, is the whole question thoroughly examined and explained by a local Forest officer, and we trust that these lines may induce some one to take up the subject.

Whilst forest conservancy in the other provinces of India has been united harmoniously to the civil administration of the country, and in provinces like Bengal, the Central Provinces, Assam and Burmah, where jungle tribes have as many requirements from the forests as in Bombay, it has been found possible to demarcate immense areas of reserved forests free from rights without seriously interfering with the people; yet forest conservancy in Bombay appears to have stirred up a strong opposition, so that even its supporters, as "Shams-ud-din," describe its management as "*grasping, stingy and faulty.*"

Can it be that not content with control over well selected and compact reserved forests, forest management, with a view principally to revenue, is trying to control scattered forest tracts throughout the province, which the wisdom of Government in other provinces has abandoned to the people. But we have no knowledge of the Bombay forests, and must look to the officers of the department there for a clear statement of the case.

INDIAN FERNS.

In September or October 1882, I presented some specimens of Indian Ferns to the herbarium of the Forest School at Dehra, and I believe that Major Bailey invited the officers of his Circle to send me any rare ferns they might meet with. None, however, have yet reached me, except from Mr. J. C. McDonell, with whom I had previously been in communication on the subject. During the present year I wish to write for the *Indian Forester* a paper on the Ferns of North-Western India, the number of which, by the discoveries made by Mr. McDonell, Mr. Duthie, Mr. H. F. Blanford and the Messrs. Mackinnon of Mussoorie, has been considerably increased since the publication of Mr. C. B. Clarke's "Review of the Ferns of Northern India," which he contributed to the Transactions of the Linnæan Society in 1880. Since then Colonel Beddome's "Ferns of British India" has appeared, and though he has followed Mr. Clarke in most of his work, he differs from him stoutly in several instances. These differences among great authorities as to the specific existence and identity of certain ferns are due to two causes, *first*, to adherence to theory, to which observation is often made to yield, and *second*, to the fact that species are often determined and described merely from herbarium specimens, without the aid of observation and study in the field.

The theory I refer to seems to be that recently observed species, however apparently distinct, are likely to be mere varieties of previously known and described species, and it is very hard

work to convince botanists who go merely by herbarium specimens of the specific difference of a new fern. This theory is the result of reaction from the views of certain botanists, English and German, who have endeavoured to found numerous genera and species upon comparatively trifling differences, occasionally observed, but which are not always found, and which most other observers cannot recognise as being of importance. Thus Van den Bosch (!) made 24 genera and 450 species out of the two generally accepted genera *Hymenophyllum* and *Trichomanes*, which according to Baker contain only 80 and 92 species respectively. But to set down, as Baker does, *Nephrodium* (Lastrea) *elongatum*, of Hooker and Greville, a quadripinnatifid fern, and also *Nephrodium cochleatum*, Don, which is so distinct a fern as to have been made a separate genus by two different authors, as mere varieties of *Nephrodium* (Last.) *Filix-mas*, Rich., which is only bipinnatifid, and has a totally different appearance and habit, is really too much for any one who has been in the habit of observing these three ferns growing in their natural habitats. Even Clarke, who has made a loving study of the Ferns of Northern India *in situ*, is to me quite incomprehensible (or is it I that am incomprehensile?) on this subject of *Nephrodium Filix-mas* and its so-called varieties. He says that this fern, including its numerous Indian forms, is abundant in the Himalaya. But I am not sure that I have ever seen the British *N. Filix-mas* in India, unless some very small specimens in Kumaun; and if the typical plant is non-existent or very rare and very local, whence come the "numerous Indian forms." A "variety" must surely be a variation originating from a type, and not merely a separate species which one or more botanists, from a dislike to multiply species, choose to call a variety of a well-known species. Clarke's "Review" professes to be merely a copious appendix to Hooker and Baker's "Synopsis Filicum," and his plates are, he says, entirely supplementary to those of Colonel Beddome, and are not intended to be complete in themselves, but in many cases I find them to be only puzzling. I cannot make out where he places the most common Lastrea of Mussoorie, which to me appears a distinct species, and in no way to resemble *L. Filix-mas*. And only yesterday happening to be up at Landour I brought down what, judging from specimens formerly gathered in Kumaun, and others received from Sikkim, I believed to be the fern called by Clarke *L. Filix-mas, var. Schimperianum*, Hochst., and found it to agree with his description, but scarcely at all with his plate.

The object of this long digression is to show that there is still great room for study of the ferns of India; and I wish to point out that Forest officers, above all other persons, are well able to collect the data for this study. To what does Colonel Beddome chiefly owe his eminence as a Pteridologist, but to the opportunities he had as Conservator of Forests in Madras? Forest

officers have all, more or less, studied botany, and all are trained observers, and all are presumably fond of nature, or why have they joined the *jangalát* department? Forests as a rule are found in hilly tracts, and so are most species of ferns. Forest officers collect flowering plants, at least the arborescent and shrubby kinds, and some of them I believe endeavour to make complete collections of the *Flora* of their Divisions and ranges. Many of the phanerogamous plants are not a whit more important from a forest point of view than are the Filices or other cryptogamia, and as an Order the ferns are much more beautiful than many orders of the flowering plants. The beauty and interest of a fern is not dependent on the fleeting color of a flower; and the shape and often the color of a frond can be perfectly preserved in a herbarium specimen, whereas the most beautiful flowering plant when pressed often becomes an untidy and discolored mass. Putting scientific interest aside, therefore, although to the physiologist and histologist ferns indeed are of extreme interest, I maintain that to an ordinary mortal much more enjoyment can be got from the collection and study of a herbarium of ferns than from a herbarium of the flowering plants, and I would appeal to Forest officers not to ignore ferns, as I am afraid they as a rule do. Let them have fair play, that is all I ask for, and if the books, or the spare time necessary for the identification of the specimens collected be not at hand or wanting, there can be no difficulty in getting that done by others. A large number of specimens, if unmounted, can be sent through the post, packed between mill-boards and in wax cloth, for a trifling sum. I think it must be quite as interesting and important to know what species of ferns are associated with certain species of trees, and are generally found in certain kinds of forest, as it is to know how flowering plants are so associated, and I remember Dr. Brandis telling me that he studied and valued ferns in this connection. *Lrainea insignis*, Hk., he instanced as characterising a certain kind of forest, I forget what. I see that Gamble, in his *Manual of Indian Timbers*, says that it is found in the pine forests of the Martaban Hills, at 4—6000 feet elevation. Mr. Gamble I believe never passes over a fern when collecting.

Not being a Forest officer, and consequently not having the opportunities and facilities for observing the rarer and more inaccessible ferns in their native haunts that I could desire, and no longer being so locomotive as I was when I began to collect ferns some 28 years ago, I am now dependent to some extent on the help of others. With the view, therefore, of adding to my collection and knowledge of the ferns of North-Western India, and so becoming better able to write the paper I propose to send to the *Indian Forester* I offer to examine, arrange, and name all ferns that may be sent to me, and in return I hope to be given such duplicates as my correspondents may be able to

spare. When desired, specimens will be faithfully returned as soon as I have examined them, or if the labels bear numbers I can send a list of the names. Also I should be glad to receive contributions of duplicates from Forest officers who are able to name their ferns for themselves. And I should be glad to exchange North-Western specimens for ferns from other parts of India.

From what I have said above it will be seen that I should particularly like to be favoured with specimens of *Nephrodiums*, both *Eunephrodiums* and *Lastreas*, and especially of *N. Filix-mas*, and its so-called varieties. *N. apiciflorum*, Hk., *N. Clarkei*, Hk. and Baker, *N. odentotoma*, Hk. and Baker, *N. rigidum*, Desv., *N. remotum*, Hk., I may also note as being among my desiderata. Another obscure group is the *Athyrium* section or sub-genus of the genus *Asplenium*, especially those species near *A. Filix-fœmina*, Bernh. Clarke says that the typical form of this species has not exactly been obtained in the Himalaya, and the Messrs. Mackinnon have pointed out that the common fern at Mussoorie, the fronds of which seem identical with the European *Filix-fœmina*, has a creeping rhizome instead of a tufted rootstock, and seems to be *A. Schimperi*, A. Br., an African fern, which Baker says differs from *A. Filix-fœmina* mainly by its wide-creeping rhizome. I should like to have all the *Athyriums* that can be sent to me.

To trained collectors, as Forest officers are, I need not mention that labels are required to authenticate specimens of plants. If the name of the fern is not known it should be left blank, but the approximate locality and altitude should be given, and the data and name of the collector, in order that the authority for the specimen may be quoted. The present season promises to be an early one, owing to the large amount of rain that has already fallen, on the outer face of the Himalaya at least, and if the rains are plentiful and well distributed this should be a good year for collecting. Already some of the larger ground ferns are springing vigorously, and have reached a good height. I should have mentioned above that discoveries of ferns new to the North-Western Himalaya are most likely to be made at high altitudes, and in deep valleys rarely visited by Europeans. The ferns along the known roads and tracks are pretty well-known. And a careful search on the trunks and branches of trees, not omitting the *coniferæ*, is likely to yield species worth collecting, of the genera *Davallia*, and *Polypodium*. A small pocket binocular field-glass is useful in such a search, or when examining cliffs and *khuds*. These epiphytal ferns must be gathered before the rains draw to a close, for they wither at once when the air gets dry. I need not add that notes about the specimens, or generally about ferns, will be very acceptable.

MUSSOORIE:
20th May, 1885.

C. W. HOPE.

Since writing the above I have observed in the *Indian Forester* for June a notable instance of the opportunities for observing and collecting ferns that present themselves to Forest officers, but alas! it is to be feared, an instance of a neglected opportunity. Mr. Bryant, in his interesting report on the Boxwood Forests of Kumaun and British Garhwál, says that "in the undergrowth, gigantic ferns, currants and raspberries, with dense and almost impenetrable thickets of ringal, render the task of inspection difficult and uncertain." "Gigantic ferns"! my curiosity and envy are roused, and I hope Mr. Bryant did secure specimens. But my hopes are faint, for he treats the ferns with scant courtesy. To be impartial, he ought to have mentioned only the Orders of the flowering plants in the undergrowth, *Rosaceæ*, *Saxifrageæ*, and *Gramineæ*, but he goes the length of naming the Genera, whereas the ferns are mentioned only by the Order. I may conjecture that *Gleichenia linearis*, Burm.,—which Mr. Clarke says is scandent over other jungle, sometimes for several hundred feet, often rooting,—was there, but these may have been other species not before known west of Nepál. Since I wrote the above appeal I have heard of the discovery within the limits of the Municipality of Mussoorie of a fern never before found in these Provinces, and hitherto known to exist in India only in two localities in Sikkim. Here is encouragement to keep one's eyes open.

30th June, 1885. C. W. H.

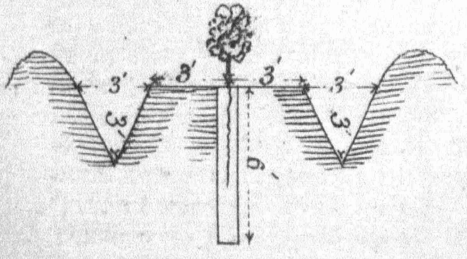
THE PLANTING OF ROADSIDE TREES.

I SHOULD like the opinions of my brother officers on the above arboricultural operation. When carrying out on a large scale, expense is a factor that has to be considerably taken into account.

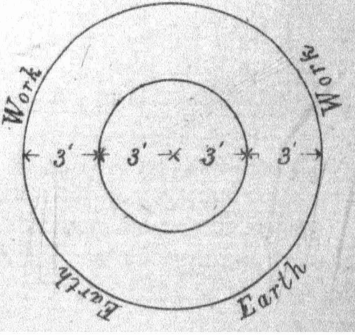
I have endeavoured to do away with some of the older and more expensive, but successful, methods, such as watering, patrolling establishment, brick walls, thorns and wooden fences.

The plan I have adopted hitherto is as follows:—

SECTION



GROUND PLAN



By planting out in "taolas" (there is no English or French equivalent of this word that I know of) —

	Rs.	A.	P.	
Cost	0	2	0	for the circular ditch;
	0	0	6	for a hole 6′ × 4″ × 4″;
	0	0	3	planting out;
	0	0	3	add cost in nursery per tree, with no other expenditure;
	0	3	0	

I find that cattle will not cross over a 3 feet ditch on to a platform only 3 feet broad.

Method of planting out.—A hole is dug 6′ × 4″ × 4″, this is half filled with rain water from the surrounding ditch, earth is filled in for about 2 feet, then the tap root of the seedling, about 4 feet in length, is lowered into the hole and filled up with earth. The object is to get the end of the root beyond the ball of earth, into cool soil, and as the water recedes for the root to follow (in soft soil for 2 feet) when the tree becomes established.

The drawbacks to this system are, that if left to natives in the rains without European supervision, they scamp the work, and charge for, but do not dig, the 6 feet holes. The result of this is, that the root being in the central ball of earth, in the following hot weather it gets baked, and the seedling often withers and dies, but this can be obviated by having the holes dug some months before, and inspected by the officer in charge. Again, if the subordinates employed break the tap root, and it does not get into cool soil, this is made manifest by their dying the following hot weather.

It is generally admitted (except perhaps by Major Campbell Walker) that we in the plains of India cannot cut off the tap roots as is often done with seedlings at home when digging out of the nursery, and it is generally allowed I think in this country, that trees do not make vigorous upward growth, until the tap root has gone down to a moist stratum, and is able to pump up its own water supply. I have known unwatered seedlings remain a few inches high for some years, and then to make several feet per annum. I have noticed also that windfalls as a rule have no tap root, or that the tap root has become rotten with age or other cause.

I have taken special precautions in the nursery to preserve the tap root, given to each tree by nature, but regarding this I intend addressing you later on in another letter.

ARBOR.

JJ. Reviews.

FOREST ADMINISTRATION REPORTS FOR 1884-85.

It seems a little strange that we are only now reviewing these reports while we are already preparing those for 1885-86, but it is better to have them late than never, and so we think our readers will excuse the delay.

The *Bengal* Report is much longer than usual, and the length has brought down remarks both from the Lieut.-Governor and the Government of India. But there is a very considerable amount of interesting matter, indeed much more than we can hope to do justice to. As usual with Bengal the strong point is the progress of systematic working. In the Introductory Chapter is given an interesting account of the forests of the Tributary Mahál of Bôd, a Native State on the Mahanadi river, whose forests are now under Government. Mr. Davis describes the Khond Máls as 'a very large sál forest with a little cultivation scattered about it,' but he gives a rather sad account of the destruction of large sál, for what seems locally to be called 'konga,' and which others know best as 'dhya, kumri, or toungya' cultivation. The results of Mr. Davis' valuation surveys gave an average per acre of—

1st class, over 6 feet girth,	...	... 2
2nd „ „ 4½ to 6 feet girth,		... 5
3rd „ „ 1½ to 4½ „	...	... 33

The area is estimated at 268 square miles, of which only about one-half can now be worked, so that at two mature trees per acre, and with a rotation of 100 years, the number of trees that can yearly be cut is $\frac{134 \times 640 \times 2}{100} = 1715$.

The Superintendent of the Tributary Mahâls (the Commissioner of Orissa) is opposed to departmental control in Bôd, but we hope that these views may give way to permanent demarcation of 'reserved forest' in places where the least possible interference with the Khonds can be arranged for. Besides the forests of Bôd, several private areas in the Hazaribagh District were reported on by Mr. Lillingston, and it is proposed to place them under Government management under section 38 of the Forest Act, *i.e.*, with the consent of the proprietors.

The area of reserved forests at the close of the year was 4,635 square miles, an addition of 313 square miles having been

made during the year, chiefly of the forests of the Angúl Mahál in Orissa. About one-third of the large area of reserved forest lies in the Sundarbans, another one-third in the comparatively out-of-the-way tracts of the Chittagong Hills and Orissa, but the rest is all in the neighbourhood of more civilized districts, and mostly capable of immediate systematic working. We note that nothing seems yet to have been done for the reservation of the important jungles of Khúrdha, or of those in the regulation district of Chittagong, though we see that in the former demarcation is progressing. The plan of making boundary marks by planting cuttings of the banyan in cairns of stone no more commends itself to us than it does to Mr. Home. The whole question of the best style of boundary mark that shall be at once cheap, permanent and conspicuous, is one which might well be discussed in our pages, and we hope that Forest officers from various provinces will assist us to consider it. Circumstances differ much in different provinces, but at any rate three classes of forest might be considered—(1), the damp forests of Burma, Bengal and the West Coast; (2), the deciduous forests of Northern and Central India, and (3), the dry forests of the Punjab, Rajputana and the Deccan.

In the Darjeeling and other divisions some interesting statistics have been collected on the average contents of marketable trees, the most important results of which are :—

'Quercus lamellosa,'	...	..	355	cubic feet.
'Michelia excelsa,'	...	...	219	„ „
'Shorea robusta,'	..	.	117	„ „
'Schima Wallichii,'	...	...	188	„ „
'Duabanga sonneratioides,'		...	144	„ „
'Bombax malabaricum,'	...	...	236	„ „

In the Darjeeling Division the results of sales in the forests instead of by Departmental Agency seem to be satisfactory, though the number of dealers is few; doubtless, this will gradually be remedied. 'Rome was not built in a day,' and it is usually necessary, in order to improve the market, and induce traders to start work, to begin by degrees, and to stick to the system even if at first it entails but a very small profit.

In the Kurseong Division, sale by tender is reported to be well suited to the tea districts, and we are glad to hear that Mr. Manson's efforts to introduce the system have succeeded. From the Buxa Division it is reported that, the provisions of the working plan have now transferred cutting to the Poro block, sketch map of which is given. It is interesting to read that the actual results of the cuttings in the Rajabhatkhawa block were that only 35 per cent. of the estimated number of trees were obtained. Much cannot of course be expected from linear valuation surveys on lines far apart, but the small outturn is possibly due to the inclusion of unsound trees in the valuations and their rejection at the fellings.

We are very glad to see that the Bengal authorities are becoming alive to the immense damage done by the graziers to the Darjeeling Hill forests. With some experience of work in various parts of India, we can call to mind no race of people so extremely unpleasant to deal with as the Darjeeling Bhutias, and the worst of their race—the milkmen of the station. The damage they do surreptitiously is incalculable, and we feel sure that unless the dwellers in the hill station make a really strong stand, the future prosperity of the sanitarium will be endangered, and the hills around Darjeeling will get as bare as those round Simla and the fuel as bad. The great difficulty seems to lie in the point that whereas any temporary deficiency in the supply of milk is at once felt by the present generation, the deficiency in wood will only fall heavily upon the future. Nothing but the strongest possible measures will check the ravages of that Colorado beetle the Bhutia, and we might suggest that with a railway into the station competition from the more tractable owners of cattle in the Terai might be induced to break the monopoly he has of the supply of milk. On this subject we quote the following from Mr. Home's report:—

"Greater attention has been paid during the year to the protection of the forests, and this has been possible owing to the time of the establishments not being so much taken up with departmental timber and fuel works as formerly. Range officers and guards have had this most important part of their duties continually impressed on them, and the special necessity for restricting grazing to the blocks open for that purpose; the result is that this latter offence is now of comparatively rare occurrence, but the wanton lopping and pollarding of trees by graziers on all sides of their *bathans* still remains to be effectually stopped. There can be no doubt that, as stated by the Divisional Officer in his report, it is principally due to this practice that the forests on these hills are composed of trees with deformed, stag-headed, often branchless, tops, each tree-top being isolated instead of assisting in forming a continuous sheet of foliage, as is seen in forests on the continent of Europe, and also in most plains forests in Bengal, and even in certain forests in these hills also, where for some reason grazing and therefore lopping has not been exercised. To this cause again is principally attributable the hollow and unsound timber trees so commonly met with; the rain water and accompanying rot having soaked into the wound caused by lopping the boughs and penetrated down into the stem of the tree itself. The result is that the existing crop in the forests is poor, the stock deficient, and the quality bad; at the same time the isolated tree-tops do not furnish the protection to the humus of the soil, and to the young forest growth which is so necessary for the regeneration of the forest when the time comes for working any given area.

"The attempt to induce the owners of milch cattle to stall feed their cattle has failed; one Bhutia only offered to do so on condition that he was allowed to have his fenced enclosure in the Tungsong block, which is closed to grazing, having been recently worked and planted up; but this application had necessarily to be refused, as it

would be impossible to effectually prevent the grazier from letting his cattle loose whenever there was no one present to stop him from doing so. The grazing fees are light, and financial considerations will not in consequence permit of a sufficient establishment being maintained to post a guard to every 'bathan.'

"The grazing cases included a large number in which carter's cattle were let into the Tungsong nurseries, and did great damage to the seedlings; and as a rule, all the cases under this head concerned draught cattle belonging to carters in the employ of purchasers or contractors of the Department.

"Severe fines for lopping in some cases were inflicted by the Magistrate owing to the manner in which men previously convicted persisted in committing similar offences: the great damage caused to the forests by this unnecessary practice was brought specially to the notice of the Deputy Commissioner; and while calling attention to the difficulties under which the small staff of guards labour in suppressing the lopping of trees and to the fact that for every case in which a man is caught red-handed (the only case in which he can be prosecuted with a fair prospect of a conviction resulting), he must commit the offence many times undetected, a set of draft rules were submitted for his consideration with the view to putting an effectual stop to this evil, should convictions in the ordinary course of the law in force fail to do so.

"The grazing rules for the Darjeeling Division have been drafted, and will be submitted shortly for the consideration of Government. That such rules are necessary must be admitted by any one acquainted with the forests in the district, and who is cognisant of the enormous damage that is done to them by the lopping of trees by graziers, which practice even the heavy fines inflicted by the courts have not appreciably reduced. It is admitted that a sufficient area is not available to meet continuously the demands of the station of Darjeeling and of the tea planters in the vicinity for timber and fuel, and as all efforts hitherto made to induce the graziers to adopt the system of stall feeding have failed, some more efficient measures for the protection of the forests from wanton damage than have yet been adopted are absolutely necessary.

"Considering that, omitting the Singalila range, which does not come within the area for the supply of the station of Darjeeling, the total area open to grazing is 11,397 acres, and that the number of cattle of all sorts that *paid for grazing* on that area during the last three years was as follows:—

	Total number of cattle.	Average per month.	Average area per head of cattle, acres.
1881-82, ...	4,198	350	32
1882-83, ...	4,972	414	28
1883-84, ...	3,765	314	36

that omitting the Singalila range, half the available reserved forest area is open to grazing: that until after the close of the year under report, and after the graziers, with the assistance of some presumably interested persons, appealed to the inhabitants of the station bringing forward alleged grievances which were admitted by the general public to be untenable and to be mis-statements of fact, there has been no rise in the price of fresh milk in the station for several years: it appears reasonable to infer that the area actually open to grazing is far in excess of the real requirements of the number of cattle necessary for the supply of the station with milk and butter."

Several disastrous fires occurred during the year. A great part of the Mohurgong, Champasari and Sivoke forests of the Kurseong Division were burnt over, but this is not a matter of surprise to anyone who knows the exceptional difficulties under which those forests labour in the shape of tracts of savannah which play the part of a powder magazine. In the Jalpaiguri Division several fires took place, two of which were traced to smokers, one being a planter, but the worst fire was that which burnt over the whole of the Koderma forest in Hazaribagh. On the whole, however, fire protection was successful, for the failures were only 7·2 per cent., and that for forests most of which have grass from 4 to 6 feet high, and some a growth over which even on the pad of an elephant it is difficult to see the country.

The accounts of 'natural reproduction' in the various districts given by Mr. Home are very interesting: we note that in protected blocks in the Darjeeling Hills seedlings of valuable trees are beginning to appear, that in the Terai and Duárs sál reproduction is good, though the seeds in some forests which have long been successfully protected from fire are choked by the heavy growth of the consequently collected and decaying vegetation. Mr. Lillingston's remarks on the result of the trampling of the soil by cattle in Palamow deserve to be quoted—

"The forests in Palamow Division are formed for the most part by stump shoots. Seedlings are however fairly plentiful, and I am fully convinced that (except in denuded portions situated far from seed-bearing trees) if grazing be prohibited and fires kept out, planting is quite unnecessary. It seems to me perfectly wonderful to see any forests other than those reserved in Palamow. In the Zamindars' forests seedlings are never found, their forests being composed entirely of stump shoots. As soon as these shoots arrive at any size, they are cut down, then the cattle, &c., are turned in to graze off the leaves and branches, trampling the surface soil into dust; then the fire season comes with the accompanying hot winds which blow away the surface soil now converted into dust, exposing the roots of these stumps to the action of the fire; then the rains come, and what remains of the surface soil not already blown away by the hot winds is washed away by the rains. This goes on year after year, and in my opinion unless some speedy measures are taken for the protection of these forests, the whole country will be shortly denuded.

"This was evidently what went on not very long ago in our present Government reserves in this division. Dead stumps are constantly met with standing by themselves on small hillocks with the roots laid bare and bearing marks of injury by fire."

It is interesting to read that Mr. Davis in making a carting track in the Angúl forests has adopted the method of breaking rocks that we used to be told was invented by Hannibal, only that he uses water instead of vinegar. The practice of splitting blocks of laterite by burning a fire over them and then pouring water along cracks has long been in practice in some districts, especially on the eastern coast.

There is not much of special interest in the chapters on Departmental working, but we see from Form 57, that the results of Departmental work were—

	Rs.
Revenue, ...	1,56,595
Expenditure, ...	1,30,207
Surplus, ...	26,388

i.e., that the *net* was only 15 per cent. of the gross revenue, and that on sales of 86,000 cubic feet of timber and 1,77,000 maunds of fuel. But we note that the whole of the revenue does not come into the year's accounts. The results of the trial shipment of woods from Chittagong to London were that 2*s.* 0¾*d.* were realized per cubic foot, a price which seems to us to be very fair, and to point to further shipments and perseverance in reducing charges, in spite of the small net loss on the trial lot. Only 366 cubic feet were sent: we cannot help thinking that if the amount had been much greater, the loss would have been transformed into considerable gain. Markets are not secured in a moment, and the immense benefit that will result if Indian timber can get a footing in the London timber sales lists should lead us to continue to persevere, and we are sure that success will come in the end. The chief woods sent were Toon, Chittagong wood,* *Mesua ferrea*, *Calophyllum polyanthum*, *Dichopsis polyantha* and *Amoora Chittagonga;* all likely to be useful for furniture except *Mesua*, which is too hard.

The financial results of the year were—

	Rs.
Revenue, ...	6,94,334
Expenditure, ...	3,87,813
Surplus, ...	3,06,521

showing the usual steady increase of receipts, which has characterized the Bengal Forest Administration since 1872.

The *Assam* Report shows very little of special interest, the Aka raids and the consequent expedition somewhat retarded work in Tezpur, while in Lakhimpur the officers in charge are

* Probably *Chikrassia tabularis*.—[ED.]

reported to have done no work. An area of 137 square miles, chiefly in the Garo Hills, was added to the reserved forests, bringing the total up to 2,314 square miles. In the matter of forest fires the year was an unfavourable one, and the area burnt amounted to 29 per cent. of that attempted. Most of the chief fires are reported to have been maliciously caused, and in one case in the Khasia Hills the fire was caused by lightning.

On the subject of natural reproduction there is obviously not much to say, but the Conservator considers that of sál to be remarkably good, and that the area of sál forest is gradually spreading. Artificial reproduction appears to be easily carried out, witness the success of *Lagerstræmia Flos-Reginæ*, and *Mesua ferrea* in Sibságar, and of indigenous oaks in the Khasia Hills. *Pistacia integerrima* is, however, reported not to do well in that locality, and mahogany is a failure at the Kulsi Plantation. Eucalyptus is reported to be also a failure in Shillong, which is rather a strange result, for in many climatic circumstances the Khasia Hills resemble the Nilgiris.

The imports of caoutchouc into Assam from the neighbouring countries reached 1,642 maunds, while 9,792 maunds were sent out of the Province by steamer. Of other exports into Bengal the chief were bamboos, canes and thatch grass, with some timber and lac.

The financial results of the year were—

	Rs.
Receipts, ...	2,11,445
Expenditure, ...	1,99,562
Surplus, ...	11,883

the chief revenue divisions being Kamrúp, Goalpara and Cachar.

Among the many rather useless Appendices the most interesting is that which records the results of the tapping of india-rubber trees, in which 50 trees gave 52 seers of rubber.

The *British Burma* report is, as usual, a very good one, and especially so is that for the Pegu Circle, where presumably work has progressed more than in Tenasserim. To the reserved forests 245 square miles were added, making a total of 3,346 square miles for the two circles. The chief additions were in South Tenasserim, the Enma forests in Prome, an addition to the Thôngzé forests in Tharrawaddy and some areas in Hanthawaddy. Fire protection was very successful in Pegu, but in Tenasserim the failures amounted to 18·4 per cent. of the area attempted. This was, as in other provinces, due to a very bad season. In Pegu the failures amounted to 11 per cent., the only disastrous fire having been that in the Chaungzouk reserve, where 600 acres, including 200 acres of plantation, were burnt.

The most important point in the Tenasserim report is the fall in the prices of teak timber during the year. The fall was

such that Thaungyin timber was reduced from Rs. 47-13 per ton to Rs. 36-12 and Rs. 24-9 only. Owing to the rapid exhaustion of the Siamese forests on the Thaungyin a very large quantity of undersized timber is being brought out, and this competes with the similar timber from the Government forests. In Appendix A. Colonel Seaton gives a note on the teak forests on the Salween river beyond the British Frontier, the information given in which points emphatically to the necessity for still greater efforts than heretofore to improve the condition of the Government reserved forests, and not only we may remark, is this necessary for Burma, but for the other teak-producing regions of India.

A new system of fixing boundary boards is reported to have been invented by Mr. Oliver, which consists in driving the board, which has previously been pointed at one end, and which is made of a hard wood like *Xylia dolabriformis*, into a soft wooded tree, so that it stands out into the flat side vertical. One great advantage of this method is said to be that the growth of the tree instead of splitting the board only fixes it more firmly. The system is worthy of note in reference to our remarks on the Bengal Report, and should be tried in localities where it is possible.

The Working-Plans Division was chiefly occupied with the collection of statistics for the Thôngzè reserve, which has now been divided into five blocks, and these again into 114 compartments, the average area of each of which is 611 acres. Of the total area of 69,734 acres, 53,534 are teak, of which, however, some 5,000 acres consist of inaccessible hills. The compartment lines have been demarcated and the boundary on the west marked off with the boards referred to above, each board measuring 9″ × 3″ × 1″. The valuation was made by means of sample areas of average quality, and the results showed the present stock to be—

Girdled or dead teak trees,	...	...	2,600
Marketable green teak trees, over 2 feet in diameter,	...	...	24,700
Sound green teak under that size,	...	...	4,08,600
Unsound green teak trees,	...	...	37,800
OTHERS—'Acacia Catechu,'	...	...	10,000
'Dipterocarpus lævis,'	...	...	4,700
'Hopea odorata,'	...	...	800
'Lagerstrœmia Flos-Reginæ,'		...	27,000
'Xylia dolabriformis,'	...	...	15,300
Others,	...	...	4,32,000

It seems to have been settled that the rotation necessary for cutting at 2 feet diameter would be 138 years for the Thôngzé forests. This is the result of trial borings with a Pressler's growth-gauge. We should have thought that the rate of growth

would have been faster. The cost of the Thôngzè working plan came to Rs. 142 per square mile.

In view of the many attempts to introduce mahogany as a forest tree it is useful to note that, as hitherto in most cases elsewhere, the results have not been entirely successful.

It seems important to observe that the results of planting in manured pits have been the most successful. It is not stated what addition to the cost was made by the manure: it would of course not be much for 11 pits; but would be a good deal for an acre of plants put down at even 10′ × 10′.

The cutting of narrow gauge ironwood (*Xylia dolabriformis*) sleepers was started during the year, and 17,631 were sold in Calcutta at Rs. 2-1. We have failed to find sufficient information as to the cost of cutting and freight, but it seems to have amounted to about 12 annas per sleeper. It is, however, satisfactory that a means has been found of utilizing the mature ironwood, and that Rs. 2-1 per sleeper can be obtained, and this is the more worthy of note now that the large and almost untouched forests of *Xylia* on the Eastern Ghâts are beginning to be utilized. The prices realized for teak timber in the Pegu Circle were Rs. 57-8-3 per log, or Rs. 59-14-11 per ton, a result which compares very favourably with the sales at Moulmein in the Tenasserim Circle.

The financial results of the year were—

	Rs.
Revenue, ...	25,09,275
Expenditure, ...	12,17,823
Surplus, ...	12,91,452

showing that the *net* revenue is just over 50 per cent. of the *gross*.

The *Coorg* Report is one which has to undergo a very detailed scrutiny indeed; for it is reviewed by the Commissioner, the Chief Commissioner, and the Government of India, and after all their remarks there is not much left for us to say. However we do not pretend to criticize departmental management, but merely to lay before our readers the points which are most likely to be of special practical interest to foresters generally, and so our field is somewhat different to that of official reviewers.

The area of reserved forests remains at 233 square miles, though it would seem that the settlement has not yet been completed.

It is pleasing, after the abuse that one hears so frequently of the *Lantana* which overruns so much of Coorg and Wynaad, to find that Mr. Dickenson has a good word for it, and considers it a good nurse for forest tree seedlings. This property is, we are sure, by no means sufficiently well-known, but we note that it is stated by Mr. Dickenson that when young the seedlings do not come up as they do later on when the *Lantana* gets higher. There is not much else of note in this report, except

that there was a want of demand for sandal, resulting in a large amount having to be held over. The rate obtained for the 36¼ tons sold was Rs. 301 per ton. Mr. Dickinson seems to have been planting sandal very successfully, and we wish he would tell us all about it in our pages to supplement the valuable experience of 'Kad Handi.' The results of the year financially were—

	Rs.
Revenue,..	87,822
Expenditure, ...	75,023
Surplus, ...	12,799

a low result, due to the bad market for sandal.

We now turn to the *Ajmere* Report, which treats of a country very different in character to Coorg; but whose report, like that of the latter, has already had to undergo three official reviews. The area of reserved forests has increased to 139 square miles, being very near the maximum limit of land available.

The most interesting matter in the Ajmere Report is the regulation of grazing and the question of grazing *versus* grass preserves. It seems that the whole of the reserved forests of Merwara were open during the year, and that during the four hot months over 5,000 head of cattle were grazed at a rate of 11 acres per head. But, as indeed one naturally finds almost everywhere, the brunt of the damage fell on the parts of the forests near the villages, the rest having been but little touched. The cutting of grass was regulated by permits in Ajmere, but allowed without permit in Merwara, but as the purchasers in Ajmere sold all they cut in October and November, when the hot weather came they had no store, and the reserved forests had to be opened to cattle. We might, however, suggest that perhaps the fault lay in opening the grass reserves too soon for cutting. The Chief Commissioner recommends the use of silos to store the grass, but perhaps it might suffice to cut and stack as hay. The Commissioner and Conservator, Mr. Saunders, has made some valuable remarks on the question of the reproduction of grass which we give here :—

"The natural reproduction of grass in the tracts we have reserved for some years appears to me to increase annually, and I have no doubt that the fact of the grass being allowed to seed before being cut or removed must have a beneficial effect on the next crop. In those tracts outside the reserves where the grass is usually eaten down by the cattle as soon almost as it springs up, I have noticed in such places as have not from any cause been grazed down at once, its reproduction is not nearly so luxuriant, and the grass does not reach the same height as in those spots which we have protected for a few years; and I have no doubt that the weight of grass thus lost by careless and indiscriminate grazing over the whole area of a village must be very large. It is mainly this consideration which has induced us to propose the formation of village reserves."

With Mr. Saunders' views we agree, but not only do we think that want of reproduction is due to prevention of seeding, but worse, that the result of grazing is that cattle tear up the roots even of the better descriptions, leaving the heavy kinds of grass, many of which are, like lemon-grass, uneatable, to spread, and eventually to monopolize the growth. In this way reproduction by shoots is also stopped. The great forest problem of the day in the drier regions of India is that of the difficulty of reconciling a plethora of cattle with a deficit in fodder. One remedy, a remedy advocated by recent writers in the public press, is for Government to interfere to check the multiplication of cattle which are not required for agriculture, and this may have to be done in some parts in order to save the land; but the chief is that of the establishment of 'fodder reserves' which, really in countries like Ajmere, means 'reserved forests,' from which grazing is excluded, but every precaution taken to save the grass and make it available at the proper time. We hope that this may be possible another year in Ajmere, and that so large a portion of the area may not have to be thrown open to grazing. And we are, therefore, very glad to see from the following extract from Mr. Lowrie's Report that the establishment of 'village reserves' is occupying much attention.

"We have now reached the limit to which the Ajmere-Merwara forests can be extended, and, with the exception of about 4,000 acres 2,300 in Ajmere (Makerwali tract), and 1,700 in Merwara (Bakula tract between Bheo and Kotkaran), there are no other tracts which can possibly be taken up without interfering with outlying hamlets and numerous patches of cultivation. Efforts are, however, now being made during the present settlement to establish village reserves, which, in my opinion, will be the means of incalculable good to the district; for one cannot help noticing that, while of late years the cattle have largely increased, the grazing grounds, both in Ajmere and Merwara, have undoubtedly deteriorated by being over-grazed. Another good result looked for from these village reserves will be the great help afforded to the Government reserves, in relieving them of any undue strain which the greater number of blocks are by no means able to bear in their present state of progress."

The result of measurements to test the factor of conversion between green wood in weight and in bulk were, that 100 cubic feet were found to average 35 to 42 maunds, giving 66 to 70 cubic feet to the ton, which is pretty much the average of fuel wood in other parts of India.

The financial results were—

	Rs.
Revenue, ...	8,198
Expenditure, ...	14,574
Deficit, ...	6,376

but the revenue is increasing gradually, and after the heavy preliminary expenses of demarcation, communications, and arti-

ficial reproduction are completed, the Ajmere forests will probably pay their expenses easily, and show one of the most successful pieces of work done by the Department in India.

(*To be continued*).

AMONGST THE SHANS.*

By COLQUHOUN.

WE recommend every forest officer to obtain a copy of this interesting book. The Shans are a race but little known to Europeans, and Mr. Colquhoun deserves great praise for the energy he has shown in bringing the subject before the English public, and in advocating the construction of a railway from Bankok to Zimmé, the capital of the Shan States belonging to Siam, and then northwards through the Independent Shan States, which have just won their freedom from King Theebaw. It is also proposed to construct branch lines to Moulmein and Pegu. We are glad to see from the papers that the English Chambers of Commerce are taking up the question in earnest, and we hope before many years are past that the railway will be *un fait accompli*, and knowing from experience that the Shan is a trader by nature, we have every confidence in its commercial success.

The book is full of interest from the first chapter to the last, and we here give some quotations concerning forest matters, in the hopes that the reader will be induced to send for the book and read it in its entirety.

Between a place called Muang Haut on the Méping and the Salween, it appears that "the teak forests are nearly worked out, and the timber that is left is small and of poor quality. Notwithstanding the great rise in the value of teak of late years, it no longer pays the Burmese contractors whose fathers made fortunes in this district, to continue to work the forests. Every stick worth floating away has been recklessly cut down and removed. No fostering shelter has been left for the young trees, nor have any been replanted. In the nine principal forests hitherto worked—the Zimmé, Hmine Long-gyee, Thoungyeen Dahguin, Mé-gu Phonmezé, Naupa, Monepégyee and the Salween—but little remains worthy of extraction. Good forests still exist, notably that of Lagon, which lies south-east of Zimmé, and those in the neighbourhood of Kiang-Tsen." Further on it is stated that besides teak there is a large export of lac from Lagon, and that no less than 14,000 piculs, or 1,862,000 lbs., were sent to Bankok last year. Kiang-Tsen is admirably situated as a trade centre in an extensive plain surrounded by fine teak forests.

In describing the toungya system, Mr. Colquhoun says that it is the *bête noir* of the officers of the forest department. In the

* The Leadenhall Press, 1885.

Shan country in suitable localities an ingenious method is adopted in order to facilitate the clearance of the ground. The work of felling is commenced from the bottom of the hill slopes ; the lower trees are only cut slightly on the upper side, the woodman, as he ascends the hill, cutting deeper and deeper until at last he completely fells the trees. In this way they fall on those below them, turn them over, and this continues to the bottom.

The dyes are of local manufacture, similar to those in use amongst the Burmese. Saffron is generally used for yellow, green is produced by dipping threads that have been dyed yellow in a boiling decoction of the leaves and twigs of the creeping *Marsdenia tinctoria*. Indigo which grows wild as well as in a cultivated state, is used for blue, the mordant being the bark of a kind of *Eugenia*. Stick-lac, the fruit of the tamarind and various woods give red. Jack, the root of a species of *Garcinia*, the flowers of the *Butea*, and the leaves of the *Memecylon*, give different tints of yellow. Black is produced from the *Diospyros Mollis, Terminalia Chebula* and *Jatropha Cuneas*. Orange from the seeds of *Bixa Orellana*.

Elephants are used throughout the Shan States and North Siam, not only for dragging timber, but for the carriage of all agricultural produce. At all towns we passed, it was a strange sight to see the number of elephants grazing together in the fields with the bullocks and buffaloes. Ten years previous to our visit, good elephants could be purchased for from three to four hundred rupees ; but owing to the great demand for them in the teak forests and timber yards the price has risen to eight hundred and even a thousand.

The extensive grassy plains and the wooded country in Northern Siam form a great breeding ground for elephants, ponies and cattle, which are carried into British and Upper Burmah and there bartered for merchandise. In 1881 no less than 41,588 head of cattle and 1,322 ponies were imported into British Burmah alone from the Shan country. Its value as a cattle-breeding country for the cultivators of British Burmah cannot be too strongly insisted upon. The main staple of Burmah, and the backbone of our trade with that country, is rice ; and for its cultivation a large number of cattle is an absolute necessity. Owing to the epidemics which frequently occur in Burmah the cultivation which has so greatly increased of late years, would have remained stationary or suffered serious decrease, had it not been for the source of supply in the Siamese-Shan country. In 1866 upwards of 100,000 head of cattle—buffaloes and bullocks,—died of the disease in Burmah.

Siam is said to be a land-locked country without roads and bridges, with its rivers impracticable for any distance for large craft, owing to rapids, fierce currents and quicksands ; it is very fertile and has a large population in the valley of the Ménam, and by no means a spare one in other parts ; it contains about

260,000 square miles of territory, and is very rich in minerals and in teak forests, the great part of which is unworkable for want of good communications. Siam is the breeding ground for the elephants that are required for our military commissariat, our teak forests and our timber yards. Our teak forests and those of Upper Burmah are rapidly being exhausted, and many of our foresters are now working those of Siam. If the country is opened out by railways the large forests existing between the 17th and 22nd parallels of latitude will become easily available and be a valuable source of supply.

From the *Pioneer* we observe that Mr. Holt Hallett read a paper on the subject before the London Chamber of Commerce on the 13th of April, and that the meeting passed a unanimous resolution "to urge upon Her Majesty's Government the great importance of furthering in every way the establishment of railway communication from British Burmah towards the south-west frontier of China." Now although the Indian Government cannot be expected to guarantee the undertaking, yet it will probably be willing to further the object in view as much as possible, and we think it would materially assist the scheme by deputing one of its forest officers to accompany Mr. Colquhoun and the expedition which is about to make a rough survey of the proposed lines. The forest officer might report on all the forests along the line of route which would be tapped, or their timber-yielding capacity, on the quantity of timber which could be exported, on the best way to supply the railway with sleepers, fuel and other wood for its own use, in fact to give advice in all matters connected with his department.

NOTES ON ARBORICULTURE IN THE BOMBAY PRESIDENCY.*

Mr. Sinclair's notes on arboriculture for the Bombay Presidency fill 24 pages of clear type, and are intended for the guidance of district officers and others, in planting roadside avenues, canal banks, &c.

Several pamphlets of this kind have appeared, the most complete which we have seen, being Mr. Ribbentrop's Arboriculture in the Punjab, an Urdu translation of which is now used for instructing the Forester's Class at the Dehra Dún Forest School.

The appearance of these pamphlets points distinctly to a want of a general authority on the subject of district arboriculture, and surely the circumstances of the different provinces of India are not so varied, but that one treatise with general rules and special chapters dealing with local requirements of each climatic zone of India would suffice.

* By W. F. Sinclair, C.S.

But the preparation of such a treatise demands time, and as in the case of Mr. Baden-Powell's Manuals, it would be well if the Government of India would select a qualified compiler of such a treatise and give him a sufficient respite from his regular duties to enable him to bring out a complete and concise work on the subject.

Mr. Sinclair's pamphlet is incomplete, and sometimes inaccurate, especially in the scientific names of the trees, which he recommends for roadsides, and he altogether ignores lopping and pruning, though the unsightly jagged ends of lopped branches we so often see along district roads prove that it is a subject on which we need enlightenment. The pamphlet, however, contains much that is useful, and especially in condemning the expensive method of rearing plants in pots and baskets, which he states has been in general use throughout the Bombay Presidency.

The question of watering roadside saplings is dealt with at some length, but he only alludes incidentally to the plan largely used in the North-Western Provinces of burying *garhas* by the side of plants so as to supply water continuously during the dry season.

He also objects to brick fences, as unsightly, though the unsightliness is only temporary, and the protection afforded much more efficaceous than that of wooden fences, which are so frequently broken down by passers-by to supply themselves with fuel for cooking their chapatis. In large undertakings this plan is also economical in so far as the bricks can be used again and again after the plants they have protected are large enough to do without further protection. Living fences of euphorbias, or of the prickly pear, are almost as difficult to rear as the saplings themselves, and are not easily made complete enough to exclude goats.

The author prefers avenues from large cuttings of Banyan, Pipal, termed locally Pipil, Bhendi or Tulip wood (*Thespesia populnea*), which he would protect by simply tying thorny branches round them with twine, to the more laborious process by transplants from nurseries.

In the list of plants which he recommends, numerous corrections are necessary. *Azadirachta* should begin with a capital letter, and so should *Sissoo* and *Arjuna*. *Indica* and *arabica* on the contrary, should have small initial letters. For *Pongarmia* we should read *Pongamia*, for *sempervireus*, *sempervirens*, and *Baunania* is probably *Bauhinia*.

Garcinea purpurea, should be *Garcinia indica* according to Gamble, and the name here adopted for this tree *Rahatamba kokam* is not given in Gamble's Indian Woods, nor is *Acacia Ramkantah*, which our author applies to the *Ramkanti*, or *Brown babul*. The tree he calls Pipri is probably *Ficus cordifolia*.

We hope that the municipality of Karachi will adopt Mr.

Sinclair's suggestion, and do away with the alleged hideous bareness of their town by planting out the *Bhendi* and *Calophyllum inophyllum*.

REPORT OF THE AMERICAN AGRICULTURAL DEPARTMENT, 1884.

THE Report of the Department of Agriculture, United States of America, for 1884, is a volume very similar to the Report for 1883, of which a notice was given in these columns last year. The working of the Bureau of Forestry is the part most likely to interest our readers. During the year a large mass of information was gathered by the agents of the Bureau in the various parts of the country, but the results are not given in the Report, being promised in a separate publication. Enquiries were made as to the growth of particular varieties of trees in the various parts of the country, and much was learnt regarding the causes of failure in tree planting. Important observations were also made with regard to the growth and preservation of forests. In many of the Western States the work of planting trees is progressing fast. In Nebraska, about 4,500 trees were planted during the year, and more than 2,000 bushels of walnut and other tree seeds. But planting even on this large scale does not counterbalance the enormous yearly loss from waste and fire, and it is singular that the Commissioner does not insist more strongly on the necessity of State measures for the preservation and protection of the existing forests. The process of lumber manufacture is conducted in a most wasteful manner at a time when the rapidly decreasing sources of supply call for the utmost economy of material. A convention of lumbermen was held at Chicago during the year, but it was found impossible to come to any agreement for checking consumption. Private individuals will not forego their own immediate profit for the sake of future profit to the State, and there is little reason to hope that the rapid consumption and destruction of the forests by the axe and by fire can be held in check. In one State, for which statistical information is available, it is shown that a steady diminution of the forest area has been going on for the last thirty years. It is probable that similar conditions prevail in all the other forest States. The great pine forests of the North-West have almost entirely disappeared, and pine wood is now brought to Chicago from the forests of the Gulf States, where the same reckless and wasteful system of lumbering has been begun. The supply of lumber now exceeds the demand, and during the past 25 years has rapidly outrun the increase of population, the forests having been consumed at an entirely unwarrantable rate. One cause of over-production is the liability of forests to destruction from fire. It frequently happens that a forest owner will cut down his trees and remove the

timber even at an unprofitable time when he thinks there is danger of their being destroyed by fire if left standing. It is useless for a private owner to attempt fire conservancy, if the proprietors of the adjoining forests neglect to do so, for if a fire breaks out by accident in a forest near him, it may destroy his whole property in spite of his outlay for its protection. Forest property is thus very unsafe, and forest owners naturally haste to make their money while they can.

Recently it has been learnt that the removal of forests means more than the loss of the trees themselves. A few years ago the connection of forests with meteorological and climatic conditions was almost unsuspected; now it is an acknowledged scientific fact. It has been proved that the destruction of forests causes droughts and floods, and changes fertile plains into arid deserts. But the lumberman gives little heed to such matters as long as he can secure his own profit. The considerations of private self-interest are manifestly insufficient to bring about any improvement in forest preservation, and it becomes the imperative duty of the State to take prompt measures to preserve the forests which still remain. It is a matter of wonder that the practical Government of the United States has not yet faced the question, and it remains to be seen how long this indifference will continue.

THE INDIAN AGRICULTURAL GAZETTE.

On 30th April, 1885, the first Number of the *Indian Agricultural Gazette* was published. It professes to be a "*Monthly Journal*" (*sic*) of Agriculture, Arts and Commerce, and is issued from the Bangabasi Press, Calcutta, being published both in English and in Bengali. In the Introduction its objects are set forth in somewhat pretentious style. It will "aim at striking at the root of all agricultural evils, by giving to all classes of landholders and tenants a thorough insight into the practice of agriculture;" and the various subjects of Agriculture, Arts and Commerce "will be handled with a unique mastery and by persons who are most competent to treat them." Following the Introduction are several articles on agricultural subjects, which if not quite fulfilling the expectations therein aroused, are still of considerable merit, and may be read with profit. There are numerous misprints throughout the number, *e.g.*, on page 22 is the extraordinary statement that a cubic foot of ensilage weighed 1,099 lbs. It is to be doubted if the English edition will have a large circulation or do any real good; but there is undoubtedly a wide field of usefulness for the Bengali edition, and indeed for any agricultural paper of simple style printed in the language of the country. We wish the *Indian Agricultural Gazette* every success.

III. Notes, Queries and Extracts.

On Friday night the House of Commons agreed, without a division, to a motion by Sir John Lubbock for a select committee to inquire whether, by the establishment of a forest school, our forests and woodlands could be rendered more remunerative. The proposer pointed out that, while our interests in the subject were greater than those of any other country in the world, as we had 2,800,000 acres under wood in Great Britain and about 340,000,000 in the Colonies, yet this was almost the only country without a forest school. He referred to the effect of scientific forestry in the Landes in France, and in India, where the net forest revenue fifteen years ago was only £52,000, while, since the establishment of a forest department, it had risen to over £400,000 per annum. As a result of neglect of the science in this country, students for India had to be trained at Nancy, a school of course specially adapted for French requirements, and the Forests in our Colonies and other possessions (Cyprus and the Cape, for example) had to be put under the control of foreigners, as there were no Englishmen trained for the work. Sir John Lubbock, however, declined to commit himself to the establishment of a Government school; it could not be left altogether to private enterprise, because a school necessarily required access to a considerable area of forest. He thought it worthy of consideration whether some intermediate system might be adopted which would enable some one or more existing institutions to benefit by national forests. Mr. Gladstone, whose interest in arboriculture is well known, could not bind the Government to the establishment of a School of Forestry, although he recognised the universal ignorance on the subject prevalent amongst land agents and others in England. He distinguished the circumstances in India, where there are important facts connected with the climate, and with the due supply of moisture in the atmosphere, which are not present in this country. The School of Forestry, moreover, he said, which was established by the Indian Government in England, was open to every one who could pay the fees. There was also the difficulty that forests of large extent are rare here, and that they are kept, not for purposes of profit, but of landscape beauty, or pleasure and sport. In conclusion, he said the Government gave their hearty approval to Sir John Lubbock's proposal, reserving, at the same time, their freedom with regard to the recommendations which the committee might make.—*Nature.*

Note.—We give the debate *verbatim* from the *Times* on the next page—[Ed.]

DEBATE IN THE HOUSE OF COMMONS ON THE ESTABLISHMENT OF A SCHOOL OF FORESTRY.

Sir J. Lubbock rose to move for a Committee to inquire whether, by the establishment of a Forest School, our forests and woodlands could be rendered more remunerative. He said that, as last year he had the opportunity of addressing the House on the subject, he would not trespass long on their indulgence. The subject was one of considerable importance. England was almost the only country without a Forest School. Such institutions existed in Prussia, Saxony, Hanover, France, Switzerland, Austria, Sweden, Spain, Russia, and, in fact, in almost every other country. The need for a Forest School in England had by no means reference only to the State forests. There were some 2,800,000 acres under wood, while in the colonies the forests were estimated to cover no less than 340,000,000 acres. In fact, our interests in this respect were larger than those of any other country in the world. He would only give two instances out of many which might be quoted to show how much might be effected in this direction. Thirty years ago the Landes was one of the poorest and most wretched regions in France. It had been judiciously planted, and was now one of the most prosperous. The increase of value was estimated at no less than £40,000,000. In India 15 years ago the net forest revenue was only £52,000, while since the establishment of a Forest Department it had risen to over £400,000, which, of course, would represent an immense increase in capital value. Competent authorities had estimated that there were over 5,000,000 acres of land in this country which might be planted with advantage. M. Boppe, one of the greatest French authorities, had recently visited this country on behalf of the India Office, and clearly indicated his opinion, though he expressed it as courteously as possible, that we were behind other countries in the management of our woodlands. Our own highest authorities were of the same opinion. Mr. Brown, in his standard work on Forestry, said that—"If our woodlands had been judiciously managed we should not find so great a part of the woodlands of Great Britain in the unprofitable state in which they are." Mr. Cruikshank, in his "Practical Forester," said that "nothing was more common than to see trees planted in situations for which they were utterly unsuited," and he gave many illustrations. The *Journal of Horticulture* said that—"It is little less than deplorable to witness the miles of woods that are practically valueless from a commercial point of view, whereas, under skilled supervision, they might yield a substantial revenue to their owners, and in addition be an advantage to the trading and agricultural community." And the same view has been ably advocated by the *Journal of Forestry*. At a recent meeting of the Convention of Royal and Parliamentary Burghs of Scot-

land, held in Edinburgh on the 8th of April last, on the motion of the Lord Provost a unanimous resolution was adopted in support of the motion which he had the honor of moving. Indeed, so necessary was a scientific training that the officers intended for the Indian Forest Service were sent to study at Nancy. No doubt that was an admirable institution; but, naturally enough, it was specially adapted to French requirements. For instance, one of the subjects was French law; again, of course, French technical terms were used. The India Office proposed, he believed, that a part of the course should in future be passed at Cooper's hill, but that the students should spend some time in France to study the practical part. That, of course, was an acknowledgement, first, of the advantage to be derived from systematic training, and, secondly, that such advantage could not be procured in this country. He was informed that, the West Indies having recently applied to the Colonial Office for some one to advise them on their forest management, it had been impossible to find any person in this country competent to do so. The Cape of Good Hope and Cyprus had also been compelled to entrust their forests to foreigners. They were indebted to the honorable member for Dublin for several interesting reports on forest management; but he would leave his honorable friend to deal with them. The present was a favourable time for the inquiry, because Dr. Schlich, the head of the Indian Forest Service, was now in England, and, he believed, that this was also the case with his predecessor, Dr. Brandis. This was not a case, he thought, which could be left altogether to private enterprise, because a Forest School necessarily required access to a considerable area of forest. He did not, however, wish to commit himself to the establishment of a Government school; he thought it at least worthy of consideration whether some intermediate system might be adopted which would enable some one or more existing institutions to benefit by the national forests. At present, the landed interest was so greatly depressed that we ought not to neglect any step by which its condition might be improved. To show the demand for timber, he reminded the House that our annual import was about £16,000,000. He believed that the average income derived from woodlands might be substantially increased. Moreover, it was desirable that the whole question should be investigated, before the Government committed themselves to a new system of training for the Indian Forest officials. He trusted, therefore, that Her Majesty's Government would consider that he had made out a strong case, at any rate, for inquiry, and that the House would accede to his motion. In conclusion, he begged to move for a Select Committee to consider whether by the establishment of a Forest School or otherwise our woodlands could be rendered more remunerative. (Hear, hear.)

Dr. Lyons, in seconding the motion, reminded the House that

he had for some years past called attention to this subject in connexion with Ireland. It was, undoubtedly, the case that of late years a very considerable diminution had taken place in the amount of wood planted. Ireland had formerly been able to carry on a large amount of iron smelting by means of her wood, and the smelting had come to an end when the supply of wood had ceased. He had to thank the noble lord the Under-Secretary for Foreign Affairs and the noble lord the Secretary for the Colonies for the ready assistance which they had given him in investigating the important subject of forestry. In reports, which included the greater portion of Europe, it was clearly laid down that those countries could no longer afford to export an unlimited amount of timber to this country. It was the same with regard to the United States and to Canada, where the timber had been recklessly cut down, and where constant forest fires destroyed as much timber as would have supplied European demands for some years. The honorable member for London University had referred to our timber imports as amounting to £16,000,000. That return, he thought, must refer to timber alone, without other forest produce, such as tar, pitch, resin, and bark. The whole of the forest produce imported into this country really amounted to about £30,000,000. With regard to European countries, France was not in a position to supply all her own industrial wants, but was importing a large amount of timber every year. We must also look for a cessation of the timber supply from the Baltic in a very short time ; the countries in that neighbourhood had lately been supplying small timber, which showed that they were cutting down miniature trees. There could be no doubt that one of the main economic causes which had hindered the progress of Ireland had been the destruction of her forests. The forests had been destroyed, partly in order to prevent the natives from sheltering there from their oppressors and partly for smelting purposes. The amount of woodland in Ireland was decreasing ; there were now 45,000 acres less than in 1841. The total amount of timber now standing in Ireland was only 350,000 acres. How much this was below the amount of woodland Ireland ought to possess was seen from the fact that the best authorities had held that to keep a country in good order and insure the proper growth of crops from one-third to one-fourth ought to be protected by woodland. The amount of woodland possessed by Great Britain, though much larger in proportion than that of Ireland, was small compared with other countries. In Prussia there were 34,000,000 acres, in France 22,000,000 acres, in Austria, 23,000,000 acres, and in Hungary 22,000,000 acres of woodland. To the excellent management and cultivation of her forests he believed that the present prosperity of Hungary was in a great measure due. He had no hesitation in saying that the amount of timber in the British Empire was infinitely below what it ought to be for

the proper protection of the soil, the proper protection of flocks and herds, and for the general development of industry. At present a large amount of timber was imported into this country; if through war one single year's supply was stopped many industries would be ruined for years to come. How much might be done by the State for forestry was, he thought, shown by the conduct of our Indian Government. The Indian Forestry Department had saved the Indian forests from the destruction and devastation to which they were rapidly becoming a prey, and had made their administration financially and in every way a great success.

Sir H. Maxwell said they had re-afforested many of the barren hillsides of Scotland. He might instance the country of Inverness, which now contained 900,000 acres—he thought the largest, Yorkshire coming next. What were they to expect from the appointment of a Select Committee? The Prime Minister said little could be expected from a Committee at this period of the session. (Mr. Gladstone dissented.) Then he must have misunderstood him. An immense amount of information would be collected and placed at the disposal of the public. It might be asked what was the difference between forestry and horticulture that it should be encouraged by the State. There was this great difference—that forestry called for an amount of foresight, patience, and self-denial which was not required in any other agricultural pursuit. No one could fail to be distressed in going about the country to see thousands of acres of neglected woodland. They all knew that the present Prime Minister took a great deal of pleasure in connexion with arboriculture, and he trusted he would devote his energies to constructive as well as destructive operations. (Laughter.)

Mr. Gladstone.—I will answer the appeal of the honorable member, but I am sorry to say that I must accompany what I have got to say with a criticism. He says he hopes I will consent to add constructive to destructive arts in arboriculture. I should have hoped that the honorable gentleman would have been disposed to contend, as I am disposed to contend, that those who cut down trees are the only true conservators of our woods. (Cheers and laughter.) He says most truly that there is a multitude of ill-managed woods in this country, because of the superstition of their owners, which prevents them from properly thinning and clearing their woods. I confess that the principle is capable of very wide application, going far beyond the limits of the present debate, but I may contend that nothing does more to increase the ground of complaint with respect to the condition of our woods and plantations than that superstition which leads owners to think that it is a kind of sacrilege to cut down trees, instead of regarding it as the only way of keeping them properly. I agree that it is quite worth while to appoint this Committee, but I must make certain reservations. I do not

wish to be bound that the Government will establish a forestry school. I will give the reason why there should not be any foregone conclusion on that subject. My honorable friend who made this motion has spoken of the forestry schools which have been instituted abroad. That was quite true, but there are two observations to be made upon it. First, they have to depend on direct aid; and, secondly, the scale of operation is infinitely larger. I cannot agree with the honorable gentleman who said of the country of Inverness that there were 900,000 acres. I am convinced that there must be a complete error there. There can be nothing approaching to that in the county of Inverness—in fact, I think the whole amount in Scotland does not reach 900,000 acres.

Sir H. Maxwell said he might have been wrong about the figures, but Inverness was larger than any other county in the United Kingdom.

Mr. Gladstone.—I do not much contest that, but there are one or two other counties also very large.

Sir H. Maxwell thought the amount for Inverness was 400,000.

Mr. Gladstone—I am afraid I cannot afford that. I think my honorable friend who introduced the motion said the total for England was 2,800,000 acres.

Sir J. Lubbock.—Including Scotland.

Mr. Gladstone.—I think there is room for improvement in the management of our woods. Everything is done almost at haphazard. There is no fixed tradition, no authority to assist them. It is remarkable that land agents, who, as a rule, are gentlemen of great intelligence, are very rarely found with any practical knowledge on this subject. We find them admirably qualified for every other department, but not in the least degree able to lend assistance on this subject. I have said that I wish to be quite free on the question of establishing schools, and I will mention one reason for this. Allusion has been made to the study of forestry in India, and eulogiums have been passed on the leading servants of the Indian Government connected with that interesting subject. The Indian Government have had most special reasons for giving attention to it. First of all, it was found impossible to make forestry profitable. I certainly do hope that this subject is in course of being dealt with satisfactorily in India. We must, however, recollect that there are important facts connected with the climate and with the due supply of moisture in the atmosphere in India which are not present in this country. The Indian Government has a school of forestry in India and also in England, and it should be known that the latter is not confined to the instruction of persons in India or contemplating residence in India. Any person who chooses to find the necessary fees for admission to the English school can receive instruction there. A great deal of difficulty in the way of studying forestry in this country arises

from the limited scale of operations which can be conducted here in consequence of our woods being broken up into such small areas. The number of properties on which there is a sufficient amount of wood to admit of large operations or of systematic training is not great. I myself have had a great deal to do in connexion with the forestry of one district, and that is certainly not a large one; and woods of 6,000 or 7,000 acres in extent are extremely rare in England. One great difficulty in the way of a proper culture of woods in this country arises from the fact of their being kept, not for the purposes of profit, but of landscape beauty, or pleasure and sport. (Hear, hear.) The interest which I take in this subject has caused me to pay particular attention to the way in which our woods are managed, and have led me to believe that we should gain a great deal if we were to have more common traditions upon the subject. (Hear, hear.) There are some parts of the midland counties where the art of wood cutting is practically unknown, and there are also many other parts of the country where scarcely any one knows how to cut down a tree. (Cheers and laughter.) That is the result of a general want of attention to the subject. I think that great utility would result from the inquiries of this Commission. I do not think that the honorable member who has just sat down quite understood what I said yesterday with regard to the appointment of Select Committees at this period of the session. What I did say was that it was unadvisable at this period of the session to appoint a Select Committee to conduct inquiries which could not produce satisfactory results; but as regards the Select Committee now asked for, the honorable member who asked for it has shown in the first place that there are satisfactory reasons for its appointment at this time, and although its labours might be for a time interrupted by the dissolution, yet a valuable partial inquiry might be made during this session and taken up and carried further in a future session. (Hear, hear.) Therefore, reserving to ourselves our freedom of opinion with regard to the recommendations which such a Committee may make, I may say that we give our hearty approval to the proposal of the honorable member, and sincerely hope that great benefits may result to the country from the inquiries which the Commtttee may make. (Hear, hear).

Sir W. Barttelot said that this important question had been greatly neglected in this country. Few men knew how to thin a plantation, and scarcely two would agree as to the proper time when the thinning should take place. It was on this account that our plantations in England had suffered so severely. He agreed entirely with the right honorable gentleman opposite as to the area of land under woods in this country. He did not think that anything like the area was under wood which had been stated by some honorable members. In the eastern division of

Sussex they had turned their attention towards the cultivation of undergrowth and underwood with the result that they found employment for large numbers of people during the winter months. (Hear, hear.) In pursuing this course, however, they could not shut their eyes to the fact that the value of this underwood and timber had greatly depreciated, and it would not be until there was a diminution of the supply from abroad that the value of timber in this country would rise to a fair level. He was informed, however, that nearly all the timber near the watercourses of America, from Italy and Spain, had been cut, and there was but little chance of many large supplies reaching us in the future from those countries. He therefore hoped that we in this country should not neglect planting timber which would grow fairly well on land that was not good for agricultural purposes. He believed that this Committee would do a great deal of good, and he should be glad if one of the results of the inquiry was to teach young men the art of cultivating timber. As it was, there was considerable difficulty in getting men to manage woods properly. (Hear, hear.)

Dr. Farquharson was glad to hear from the right honorable gentleman that at length forest culture was to be placed in this country upon a satisfactory basis. In England a most haphazard mode of planting had been pursued for a long time. A great deal of waste land had been made use of for agricultural purposes, for which it was altogether unfitted, whereas it would have done admirably for planting trees. Where the planting of trees was properly carried out their culture paid admirably. He trusted that in future years it would not be necessary to have recourse to foreign schools of forestry, but that an efficient school would be established in this country.

Mr. Dawson thought the question might serviceably be brought before the Committee on Irish Industries, as there was no part of the United Kingdom where improved methods of forestry would be of more advantage than in Ireland. The honorable member for Dublin, who had made himself remarkble by devotion to this question, had dealt instructively with many branches of the subject, but there was one to which he had not referred. In the Black Forest and in Switzerland the young people were profitably employed in making the thousands of toys which were imported into this country. There was no reason why many thousands of our unemployed and starving population might not find the means of subsistence in this industry. The Prime Minister had deprecated the interference of the State, but the State had in Holland reclaimed the land from the sea, and here at home was expending its resources in teaching many subjects to the children of the poor, which, from a wage-earning point of view, were absolutely useless. (Hear, hear.) It would be much wiser that children should receive good technical training in the trades by which they were to make their living. (Hear, hear.)

Sir G. Campbell thought one had no need to go further than Kensington gardens to see what a lamentable want existed of scientfic forestry in this country. He agreed that the Indian Forestry Department had done good work, but he was inclined to think that it had been a little overpraised, as there was a great want of scientific method in the system which it pursued.

Mr. Ackers said that subject was one in which the three kingdoms were equally interested. There was no good school of forestry in the country, and the art of forestry might be said to be absolutely unknown. Similar treatment was apparently applied to all trees alike, and it did not appear to be known that what was good for one tree killed another. While agreeing with the Prime Minister that there should be no foregone conclusion, he hoped the matter would not be entered upon with the idea that a school of forestry was not necessary, and that Government assistance should not be given to it.

Sir J. Lubbock's motion was then agreed to.

Chinese Insect-white Wax.—A parliamentary paper which has recently been published (China, No. 2, 1885) contains a report of a journey through Central Sze-chu'an, which was made by Mr. Hosie, Consular Agent at Chung-king, chiefly for the purpose of collecting information on the subject of insect-white wax, specimens of the insect wax-trees, and forms of the wax product, at the request of Sir Joseph Hooker. The report describes the country traversed, its trade and trading capabilities, and such information as was attainable on any commercial product of the district; but the portion relating to insect-white wax is the most interesting part of the paper.

"Insect tree" is the name given by the Chinese in the extreme west of Sze-chu'an to what is probably the *Ligustrum lucidum* of botanists. The point will doubtless be decided at Kew by the specimens which Mr. Hosie has sent home. It is also called the winter-green or evergreen tree; while in the east of the province it is known as the "crackling flea tree," owing, it is said, to the sputtering of the wood when burned. It is an evergreen, with leaves which spring in pairs from the branches. They are thick, dark green, glossy, ovate, and pointed. In the end of May or beginning of June the tree bears clusters of small white flowers, which give place to small seeds of a dark blue colour. In the month of May, 1883, Mr. Hosie found attached to the bark of the boughs and twigs numerous brown pea-shaped excrescences or galls, in various stages of development. In the earlier stages they looked like minute univalves clinging to the bark. The larger galls were readily detachable, and, when opened, presented either a whitey-brown pulpy mass, or a crowd of minute animals, whose movements were only just perceptible to the naked eye. Last year an

opportunity of examining these galls and their contents with some minuteness in the chief wax-producing locality in the province presented itself. They are very brittle, and there was found, on opening them, a swarm of brown creatures, like minute lice, each with six legs and a pair of club *antennæ*, crawling about. The great majority of the galls also contained either a small white bag or cocoon, containing a chrysalis, whose movements were visible through the thin covering, or a small black beetle. This beetle also has six legs, and is provided with a long proboscis, armed with a pair of pincers. It is called by the Chinese the "buffalo," probably from its ungainly appearance. After a few days it turned out that each chrysalis developed into a black beetle, or "buffalo." If left undisturbed in the broken gall, the beetle will, heedless of the wax insects, which begin to crawl outside and inside the gall, continue to burrow with his proboscis and pincers in the inner lining of the gall, which is apparently his food. The Chinese believe that he eats his minute companions in the gall, or at any rate injures them with the pressure of his heavy body, and galls in which beetles are numerous sell cheaper than others. But careful investigation showed that the beetle does not eat the other insects, and that his purpose within the gall is a more useful one. When a gall is plucked from the insect tree an orifice is disclosed where it was attached to the bark. By this the wax insects escape. But if the gall remained attached to the tree no mode of escape would appear to be provided for them. The beetle provides this mode. With his pincers he gradually bores a hole in the covering of the gall, which is of sufficient size to allow him to escape from his imprisonment, and which allows egress at the same time to the wax insects. When the beetles were removed from the galls some of them made efforts to fly; but at that time their *elytræ* were not sufficiently developed, and they had to content themselves with crawling, a movement which, owing to the long proboscis, they performed very clumsily. Through the orifice thus created by the beetle the insects escape to the branches of the tree, if the gall be not plucked soon enough. When plucked the galls are carried in headlong flight by bearers who travel through the night for coolness to the market towns, and every endeavour is made to preserve a cool temperature in order that the heat may not force the insects to escape from the galls during the journey.

The wax-tree is usually a stump, varying from three or four to a dozen feet in height, with numerous sprouts or branches rising from the gnarled top of the stem. The leaves spring in pairs from the branches. They are light green, ovate, pointed, serrated, and deciduous. The branches are rarely found more than 6 feet in length, as those on which the wax is produced are cut from the stems with it. The sprouts of one and two years' growth are too pliant, and it is only in the third year,

when they are again sufficiently strong to resist the wind, that wax insects are placed on them. In June some of the trees bear bunches apparently of seeds in small pods, and specimens of these have been sent to Kew.

The wax insects are transferred to these trees about the beginning of May. They are made into small packets of twenty or thirty galls, which are inclosed in a leaf of the wood-oil tree, the edges of which are fastened together with rice-straw. These small packets are then suspended close to the branches under which they hang. A few rough holes are made in the leaf by means of a large needle, so that the insects may find their way through them to the branches. On emerging from the galls the insects creep rapidly up the branches to the leaves, where they remain for thirteen days, until their mouths and limbs are strong. During this period they are said to moult, casting off "a hairy garment," which has grown in this short time. They then descend to the tender branches, on the under sides of which they fix themselves to the bark by their mouths. Gradually the upper surfaces of the branches are also dotted with the insects. They are said not to move from the spots to which they attach themselves. The Chinese idea is that they live on dew, and that the wax perspires from the bodies of the insects. The specimens of the branches encrusted with wax show that the insects construct a series of galleries stretching from the bark to the outer surface of the wax. At an early stage of wax production an insect, called by the Chinese the "wax-dog," is developed. Mr. Hosie was unable to obtain a specimen of this insect, but it was described to him as a caterpillar, in size and appearance like a brown bean. His theory (which, he confesses, is unsupported by outside evidence) is that the female of the "buffalo" beetle, already mentioned, deposits eggs on the boughs of the insect tree or the wax-tree, as the case may be, and that the "wax-dog" is the offspring of the buffalo. There may possibly be a connection between this caterpillar and the gall containing the wax insects. It is said that during the night and early morning the insects relax their hold of the bark, and that during the heat of the day they again take firm hold of it. The owners of trees are in the habit, during the first month, of belabouring the trees with thick clubs to shake off the "wax-dog," which, they assert, destroys the wax insects. After this period the branches are coated with wax, and the "wax-dog" is consequently unable to reach his prey. The first appearance of wax in the boughs and twigs has been likened to a coating of sulphate of quinine. This gradually becomes thicker, until, after a period of from ninety to a hundred days, the wax in good years has attained a thickness of about a quarter of an inch. When the wax is ready, the branches are lopped off, and as much of the wax as possible is removed by hand. This is placed in an iron pot with water, and the wax, rising to the

surface at melting-point, is skimmed off and placed in round moulds, whence it emerges as the white wax of commerce. The wax which cannot be removed by hand is placed with the twigs in a pot with water, and the same process is gone through. This latter is less white and of an inferior quality. But the Chinese, with their usual carefulness that nothing be lost or wasted, take the insects, which have meantime sunk to the bottom of the pot, and, placing them in a bag, squeeze them until they have given up the last drop of the wax. They finish their short, industrious existence by being thrown to the pigs. The market price of the wax is about 1*s.* 6*d.* per pound. It is used chiefly in the manufacture of candles. It melts at 160° F., while tallow melts at about 95°. In Sze-chu'an it is mixed with tallow to give the latter greater consistency, and candles, when made, are dipped in melted white wax to give them a harder sheathing and to prevent the tallow from running over when they are lighted.—*Nature.*

CHINESE INSECT WAX.—The beetle alluded to in connection with this subject in the last number of *Nature*, (Vol. xxxi, page 615) is a probably undescribed species of *Brachytarsus*, a genus of the family *Anthribidæ*, allied to the *Curculionidæ*. Through the courtesy of the authorities at Kew I have had specimens before me. The idea that it acts as a sort of midwife to assist at the birth of infant *Coccidæ* is quite erroneous. The genus *Brachytarsus* is a true parasite on *Coccus*, and its habits, in this connection, in Europe, have long been known. It is of course interesting to find "unity of habit" prevailing in the case of *Coccus Pé-la*, even to its parasite; but with regard to the latter there is nothing new; some points in the general economy of the wax insect, in the notes published, are of far greater importance. R. MCLACHLAN—*Nature.*

NOTES ON THE FLORA OF THE MURGHAB VALLEY.—The following notes by our botanist, Dr. Aitchison, on the country between Khusan and this may be of interest to some of your readers.

At Khusan the village was surrounded with enclosures of low mud walls, and along the sides of these walls, which were some 4 feet or more in height, were planted a row of mulberry trees. These were treated as pollards, and from the annual shoots that spring from the main stem are collected the leaves for feeding silkworms. These numerous mulberry trees point to the fact that silk culture is one of the industries of the place. The open spaces within the walled enclosures are chiefly devoted to the cultivation of lucerne, cotton, melons, and the castor oil plant, the last for its seeds, from which an oil is extracted for

burning and not employed as a medicine, although the seed itself is used medicinally.

Some small orchards of apricots and apples were noticed, with a few trees of elocagnus, cultivated for its scented flowers as well as fruit, and a zizphus, this yielding the well know "unáb." Over graves and holy places a specimen of ash was common; one tree measured nearly 11 feet in circumference, but it branched soon and was only some 20 feet in height. A few shrubs of a garden-rose were seen, the first since leaving Quetta. White beetroot, turnips, and onions are the common vegetables to be got at this time of the year, all good in their way. Among rubbish heaps in the vicinity of the village, stramonium, known to be poisonous, occurred. Bees are unknown here, honey being imported from Persia. Much land was under cultivation and all assisted by irrigation. The banks of the river were covered with a good forest of the Euphratic poplar, the trees large, from 6 feet to 9 feet in circumference, and yielding fair-sized timber; on the margin of the stream tamarisk and a tall grass formed, with young poplars, a dense undergrowth in which numerous wild pigs of great size resort. The surrounding hills were devoid even of scrub, and looked bare and bleak, but upon closer inspection were found to be covered with the remains of grasses and plants, of which the stems had died down during the winter, and in many places the slopes were characterized remarkably by the still standing stems of the assafœtida and of another similar umbelliferous plant that yields an aromatic gum resin. These stems appeared as so many bamboo staves stuck irregularly into the ground, their branches having been long ago blown off, and many were spread prostrate by the prevailing winds.

The country between Khusan and the ascent to the Chashma Sabz Pass was extremely analogous to that we had passed over before reaching Khusan, with the exception that we came across a very curious bee-like, hairy fly, that irritated the horses excessively by entering their nostrils. Some specimens of which were collected with great difficulty. In the ascent on to the path a species of thorny amygdalus formed a dense, woody shrub of from 4 feet to 6 feet. Here the country was one great sheet of grass and remained so for several marches. On the pass itself, at an altitude of some feet, a rhubarb, a tall polygonum, and a species of eremurus covered the northern slopes, and as the descent was being made come good-sized trees of juniper were seen in the deep ravines where water was present, and in its vicinity a hawthorn, a cotoncasta, a wild eleagnus, a tree willow, with an extensively scrambling bramble, formed a dense impassable thicket. From the base of these hills to Bala Murghab the country seemed to consist of a sea of rounded sand-like hills that were crowded with what appeared to be solely the remains of a great prairie of grass, without showing the signs of any form of scrub; but during the summer there can be no doubt that many plants

exist which at present cannot be seen owing to their stems having withered down early. At Karobagh, and for several marches further on, the camp followers dug out great living roots of several plants, but chiefly of a species of liquorice for eating, employing it as tooth brushes and as fuel; they burnt fairly well although green and fresh. Though an occasional tree or a few clumps were seen of pistachio, the nut of which is so largely exported to India, only first did the route of the camp lie through a continuous forest of this tree in marching between Kodja Kalandar and Karez Darra; it occurs to a greater or less extent through the hills to the immediate vicinity of the Murghab river. The tree at this time of the year is extremely characteristic. Owing to its at present being devoid of leaves the branches give a local gray stone-like colouring to the otherwise bare hills, and at a distance, where the forest is dense, the hills look as if seen through smoke. These natural forests of the pistachio give the name of Pistalik to these parts, as the eleagnus does to the Jigdalik Pass, where it was once very numerous. The exportation of the nuts for food, as well as of the galls from the leaves of the tree for the purposes of dyeing, yields a revenue to the country, which is collected before the harvest is allowed to be removed by the nomad tribes. In the higher hills towards Herat and eastwards for 6,000 feet and upwards the juniper forms a thin forest, chiefly on the northern slopes, and there is said to be no other pine on these ranges.

In a deep valley, at about 5,000 feet, some few miles to the south of Karez Darra, a maple, willow, wild-pear, hawthorn, eleagnus, and a stout woody berberis were found. In the vicinity of a village close to this some very large cultivated pear trees were seen, with a jungle of zizphus, as if of natural formation; but here the tree may have spread from cultivation.

At present the whole land from Khusan to the valley of the Murghab is one great pastoral country, covered with flocks of almost unlimited number, their number being limited only by the absence or difficulty of getting water. Where sheep do not cover the ground, deer in thousands, wild donkeys, and oorial are said to be innumerable. The soil is excessively rich and the hills are all covered with—indeed, consist of—a very rich alluvial deposit, so much so that it is said by the inhabitants to yield a hundredfold.

The ruins of very extensive canals for irrigation are still to be traced on every hillside, with scarcely an exception, showing how largely the country had been once irrigated, and how since those days in many instances the hills had actually worn down to their present condition. There can be no doubt but that with peace and labour this country would rapidly prove a most fertile one, and would become rapidly populated. Even within the last two or three years, since the Turcomans have been prevented from making their usual raids, villages have sprung up and cultiva-

tion has been renewed in what has been for a time (in one sense) a desert.—*Pioneer.*

CEARA RUBBER (*Manihot Glaziovii*) IN THE KULSI PLANTATION, KAMRUP, ASSAM.—A small quantity of Ceara Rubber seed was received in June 1879, and sown on the 25th of that month on a seed bed situated on the spur of a hill facing the east. The soil of this spur is very deep, being composed of a brown or reddish loam mixed with a portion of clay. The consistency of the soil is neither very stiff nor very loose, but moderate. In appearance it is somewhat like the laterite soil of Eng forest in Burmah, or of the ferruginous soil of the Sivalik hills. The hill from which the above spur projects is situated on the right bank of the Kulsi river, which, issuing from the Khasia hills, joins the Brahmaputra at an equal distance between Gauhati and Goalpara. Teak plantations of some 8 or 9 years' standing cover the hill alluded to above. On the extreme end of this spur, which terminates rather abruptly in the Kulsi river, is erected a beautiful bungalow for the accommodation of the Forest officer. This bungalow faces the south, and commands an extensive view, covering some miles, of the Kulsi valley. The site selected for the nursery of the Ceara Rubber is protected on the two sides, north and west, by the range of hills which run almost parallel to the Kulsi river. Thus the violent north-westerly winds, which blow with much force for many months of the year, have less effect on the nursery bed than would have been the case had it been situated on some other open place. The climate of this place may be said to be semi-tropical. The rain commences from the middle or end of April, and lasts till the beginning of November. The average rain fall is 78 inches, and the average temperature is about 70° Fahr.

The seed was sent for an experiment to ascertain whether this plant, whose native home is at Ceara in Brazil, would grow as well in Assam, the climate of which place is said to resemble that of the Ceara district. As stated elsewhere, the seed was sown on the 25th of June, but nothing came out till the end of September, when only two or three seeds germinated. The seed is very hard, harder than a plumstone. It is about the size of a small bean. Its vitality is wonderful. The seed sown in June, 1879 was taken out from the nursery bed in March 1881 without being injured or decayed; and one of them left in the bed germinated in July 1882, after being for over three years in the ground. Some of the seeds thus taken were filed in order to hasten their germination, if possible, while the rest were soaked in a weak solution of sulphuric acid and water for a day. They were sown again after undergoing the above processes separately in two beds. Of those which were filed only two germinated within a fortnight, but none of those steeped

in sulphuric acid and water. This simple fact decided Mr. Mein, the divisional Forest officer, to adopt the method of filing the Ceara Rubber seed before sowing it, and it has acted admirably well in respect of easy germination. Before experience was gained on the subject, the seeds were filed sometimes on the top, at right angles to its longitudinal axis, thus increasing the aperture of the hilum or microphyle, and sometimes on the two sides of the hilum scouring the hard testa so that it may easily burst at the time of germination. The second system was very successful while the first system failed altogether. Thus by the second system all the seeds germinated within from 14 to 44 days.

The young seedling with the two cotyledonary leaves looks like the castor-oil plant, but soon after, when more leaves come out, its appearance changes, and the plant is sometimes mistaken for a Papua seedling, for its juice resembles that of the Papua plant. When the seedlings are 9 inches or 1 foot in height they are transplanted in suitable localities, and are well fenced, lest the deer should take a fancy to them. As regards locality, perfect drainage of the soil and subsoil is essentially necessary for the cultivation of this plant. It also prefers open high ground and hill-sides to shady or low-lying grounds. The growth of this plant is wonderfully rapid. The two seedlings which came up in September 1879 were found, when measured on the 16th June, 1880, to be 6 feet and 3 feet in height respectively, and in May of the following year 21 feet 9 inches and 14 feet, so that one of them has grown over 1 foot per month. Another plant on measurement after six months from date of germination was found to be 19 feet in height. It is a very soft-wooded tree, and requires strong wooden posts for support. The tree will probably coppice well. One small plant was broken to the ground by a violent storm, and the stool, after a few days, had been noticed to throw out fine and vigorous shoots. It can be easily propagated by cuttings, since some of the branches were cut and planted out with a view to propagate it, and they were seen to sprout. In the Kulsi plantation, there are now probably 150 plants from 4 to 40 feet in height. Their girths vary from 2 to 20 feet. Here the trees begin to lose their leaves in January, and remain leafless for more than a month. At that time they very much resemble in appearance a birch tree, and the surface of the bark comes off in the same way in their peelings. The seed-bearing trees are the last to put forth leaves, and this they do when all the seeds have fallen to the ground. The two biggest trees seeded profusely during the past two years. They commence to flower in the beginning of December, and the seed ripens by the beginning of March. The bunches of ripe fruit remain on the tree while it is leafless. The pod when ripe bursts, and goes to pieces, so that the seeds are scattered on the ground at some distance from the parent tree.—JOGESWAR SEN.—*Indian Agriculturist.*

THE WEIGHT OF AN AXE.—I well remember my first axe, and my early experience with it. It weighed 4¼ lbs., being the heaviest one I could find at the time. I was fresh from school—fresh from a class in natural philosophy, one of my favourite studies.

I knew all about *inertia*, and had learned something of the force of gravity and the laws of falling bodies; had rightly guessed that chopping wood might be hard work, and determined that my knowledge of physics should help me out.

I would have a heavy axe, a long handle—would move slowly, and take strokes that would *count* when they fell. My axe-handle was 34 inches in length, the longest one in the store. I had hired a tough little French Canadian, weighing about 120 lbs., to help me at this work. When he came, he brought an axe—a mere toy, I call it. I think it weighed 2½ lbs., with a handle only 26 inches long. I told him I had a fair-size job for him, and thought it would pay him to buy a full-grown axe. He smiled, and said he guessed his would do. I tried to explain to him the beauties of a heavy axe, and the wonderful advantage of a long handle. But it was all in vain; I was only wasting time; he could not understand it.

"Poor fellow," I thought, "he knows nothing of the beautiful science of physics. It is too bad that he should thus waste his strength through ignorance, and be unwilling to listen to the voice of wisdom."

We went to the wood-lot and began work. I had decided that we would work separately during the first day or two, in order that I might show him what I could do.

As I began to swing my axe, I felt proud of its ponderous blows that rang through the woods, and rather pitied the poor fellow who was drumming away with his little axe, taking about two blows to my one.

Presently I had to stop to rest, and then again, and still again. But Joe, my man, kept pecking away quietly, steadily, and easily.

Every few minutes I would stop to take breath; but Joe seemed perfectly able to do all necessary breathing without stopping his work for the purpose.

When night came, we piled up our wood and measured it. Joe's pile measured 1½ cords; mine only ¾ of a cord.

During the early part of the day, I had planned giving Joe another lesson in the evening, to see if I could not make him understand the elementary principles of wood-cutting, and the philosophical requirements of an axe.

But when night came I decided that perhaps it would be as well to let him go on in ignorance, and thereafter remained silent on the subject.

The next day I felt lame, and stayed at home. Joe put up his cord and a half as usual.

When I went to the woods again, Joe and I worked together. Not many days passed before I found an excuse for buying a lighter axe and a shorter handle. And every axe and handle that I have bought since then, has been lighter and shorter than its predecessor.

Whenever I use an axe now, I select one very much like Joe's, both in weight and length of handle. I can use this without getting at all out of breath, and can hit twice in the same place. The result is, I can do more and better work, and save a vast amount of strength.

I write this as a word of caution to the inexperienced wood-chopper, when about to purchase an axe.—H. L. C., in *Albany Cultivator.*

Improved Method of Preserving Wood.—The improved French method of preserving wood by the application of lime is found to work well. The plan is to pile the planks in a tank, and to put over all a layer of quicklime, which is gradually slaked with water. Timber for mines requires about a week to be thoroughly impregnated, and other wood more or less time according to its thickness. The material acquires remarkable consistence and hardness, it is stated, on being subjected to this simple process, and the assertion is made that it will never rot. Beech-wood prepared in this way for hammers, and other tools for ironwork, is found to acquire the hardness of oak, without parting with any of its well-known elasticity or toughness, and it also lasts longer.

Sabicu.—There has been a very active demand for Sabicu* during the past week to fill large Government contracts for the manufacture of saddle trees for the use of our troops in India. The Government authorities specified the use of an Indian timber called "Padouk," a wood of a reddish colour, and which is not attacked by the white ant, but from the absence of this wood in the English market Sabicu has been substituted.—*Timber Trades Journal.*

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* Sabicu is the wood of *Lysiloma Sabicu*, a leguminous species resembling acacia from Cuba, whence it is largely exported.

The wood is dark coloured, very heavy, hard, and durable, and owing to its hardness was used for the staircases of the Great Exhibition of 1851, when in spite of the immense number of people who used them, the stairs were found to be scarcely worn at all.—[Ed.]

JV. EXTRACTS FROM OFFICIAL GAZETTES.

1.—GAZETTE OF INDIA—

No. 528.—*The 9th June, 1885.*—Consequent on the return to duty from furlough of *Lieutenant-Colonel J. C. Doveton*, M.S.C., Conservator of Forests of the 1st grade in the Central Provinces, the following officers will revert to the appointments indicated opposite their names, with effect from the 21st May, 1885 :—

Major G. J. vanSomeren, M.G.L.L., officiating Conservator of Forests, 1st grade, Berar, to be officiating Conservator of Forests, 2nd grade, Berar.

Mr. R. H. E. Thompson, officiating Conservator of Forests, 3rd grade, Central Provinces, to be Deputy Conservator of Forests, 1st grade, Central Provinces.

Mr. R. H. M. Ellis, officiating Deputy Conservator of Forests, 1st grade, Bengal, to be Deputy Conservator of Forests, 2nd grade, Bengal.

Mr. F. B. Dickinson, officiating Deputy Conservator of Forests, 2nd grade, Coorg, to be Deputy Conservator of Forests, 3rd grade, Coorg.

No. 541.—*The 11th June, 1885.—Mr. C. Bagshawe*, Deputy Conservator of Forests of the 2nd grade in the North-Western Provinces and Oudh, is appointed to officiate in the 1st grade of Deputy Conservators of Forests, during the absence on three months' privilege leave of *Mr. W. Jacob*, Deputy Conservator of the 1st grade in the Central Provinces, from the 19th July to the 18th October, 1884 (both dates inclusive).

No. 1274.—*The 5th June, 1885.*—Civil Leave Code, pages 221-228, Schedule B.—Strike out the following names in this Schedule :—

Adamson, J., ... Assistant Conservator of Forests, 1st grade.
Dodsworth, R. S., ... Assistant Conservator of Forests.
Macpherson, J., ... Assistant Conservator of Forests.
O'Callaghan, I. E., Deputy Conservator of Forests, 2nd grade.
Slym, M. J., ... Deputy Conservator of Forests, 2nd grade, and insert the name of—
Davis, H. H., ... Deputy Conservator of Forests in its proper place in the Schedule.

2.—CALCUTTA GAZETTE—

The 21st May, 1885.—Mr. G. W. Strettell, Deputy Conservator of Forests, Bengal, has been granted by Her Majesty's Secretary of State for India an extension of leave for six months on sick certificate.

The 11th June, 1885.—Mr. C. A. G. Lillingston, Assistant Conservator of Forests, Singbhoom Forest Sub-Division, is allowed privilege leave for one month, under sections 71 to

74, Chapter V. of the Civil Leave Code, with effect from the date on which he may be relieved by *Baboo Sree Dhur Chuckerbutty*, Sub-Assistant Conservator of Forests, Singbhoom Sub-Division.

Mr. F. B. Manson, Deputy Conservator of Forests, Chota Nagpore Division, will have charge of the Singbhoom Sub-Division in addition to his other duties.

The 11th June, 1885.—Mr. E. G. Chester, Deputy Conservator of Forests, Darjeeling Forest Division, is allowed privilege leave for six weeks, under sections 71 to 74, Chapter V. of the Civil Leave Code, with effect from the 21st June, 1885.

Mr. A. L. Home, Conservator of Forests, will take charge of the Darjeeling Forest Division, and of the Darjeeling and Teesta Forest Sub-Divisions, in addition to his other duties, during *Mr. Chester's* absence.

The 12th June, 1885.—The following postings of officers are sanctioned from 1st June, 1885, with effect from which date the forest charges hitherto known as the Darjeeling, Teesta and Kurseong Forest Divisions are grouped together, and will form the Darjeeling Forest Division :—

Mr. E. G. Chester, Deputy Conservator of Forests, to the charge of the Darjeeling Forest Division, and of the Darjeeling and Teesta Forest Sub-Divisions of that Division.

Mr. J. C. Mendes, Officiating Sub-Assistant Conservator of Forests, attached to the Darjeeling Forest Sub-Division.

Mr. R. L. Heinig, Assistant Conservator of Forests, to the charge of the Kurseong Forest Sub-Division.

The 26th June, 1885.—Mr. R. L. Heinig, Assistant Conservator of Forests, passed the departmental examinations—

In land revenue system of Bengal, ... With credit.
In forest law, ... Ditto.

Erratum. The 27th June, 1885.—In the first and second line of the notification, dated the 11th June, 1885, published in the *Calcutta Gazette* of the 17th idem, Part I., page 583, under the head Forest Department, *for the words* "Mr. C. A. G. Lillingston, Assistant Conservator of Forests, Singbhoom," *read* "Mr. C. A. G. Lillingston, Assistant Conservator of Forests, Palamow."

3.—North-West Provinces and Oudh Gazette—

No. $\frac{1810}{\text{II-448-9-2}}$.—*The 30th May, 1885.—Mr. A. Smythies*, Deputy Conservator of Forests, in charge of the Dehra Dun Division, privilege leave for forty-two days, with effect from the 18th May, 1885, or subsequent date.

No. $\frac{1848}{\text{II-448-9-4}}$.—*Mr. E. F. Litchfield*, Assistant Conservator of Forests, attached to the Forest Survey Branch, privilege leave for one month and fifteen days, with effect from the 1st June, 1885, or subsequent date.

No. $\frac{2015}{\text{II-448-8-2}}$.—*The 8th June, 1885.—Mr. F. B. Bryant*, Assistant Conservator of Forests, Kumaun Division, special leave on urgent private affairs for six months, with effect from the 15th May, 1885, or subsequent date.

No. $\frac{2236}{\text{II-445-4-15}}$.—*The 24th June, 1885.*—With effect from the 19th July, 1885, *vice Mr. C. Bagshawe*, promoted—

Mr. G. W. Allan, Deputy Conservator of Forests, 3rd grade, to officiate in the 2nd grade.

Mr. J. M. Braidwood, Deputy Conservator of Forests, 4th grade, to officiate in the 3rd grade.

Mr. N. Hearle, Assistant Conservator of Forests, 1st grade, to officiate as Deputy Conservator of Forests, 4th grade.

No. $\frac{2236\text{ A.}}{\text{II-445-4-16}}$.—*The 24th June, 1885.*—With effect from the 12th October, 1884—

Mr. E. F. Litchfield, Assistant Conservator of Forests, 1st grade, attached to the Forest Survey Branch, to officiate as Deputy Conservator of Forests, 4th grade.

No. $\frac{2240}{\text{II-445-4-20}}$.—*The 24th June, 1885.*—With effect from the 19th October, 1884, the date on which *Mr. Bagshawe* reverted to his substantive appointment—

Mr. G. W. Allan, Officiating Deputy Conservator of Forests, 2nd grade, to revert to his substantive appointment of Deputy Conservator of Forests, 3rd grade.

Mr. J. M. Braidwood, Officiating Deputy Conservator of Forests, 3rd grade, to revert to his substantive appointment of Deputy Conservator of Forests, 4th grade.

Mr. E. F. Litchfield, Officiating Deputy Conservator of Forests, 4th grade, to revert to his substantive appointment of Assistant Conservator of Forests, 1st grade.

4.—PUNJAB GAZETTE—

No. 58.—*The 26th May, 1885.*—*Mr. F. O. Lemarchand*, Deputy Conservator of Forests, from the Lahore to the Kulu Division.

Mr. F. O. Lemarchand made over charge of the former on the afternoon of the 18th April, 1885, and received charge of the latter Division from *Mr. L. G. Smith*, Officiating Deputy Conservator, on the afternoon of the 29th idem.

5.—CENTRAL PROVINCES GAZETTE—

No. 2091.—*The 5th June, 1885.*—*Mr. H. Moore*, Assistant Conservator of Forests, reported his arrival at Bombay on 23rd ultimo, on return from the furlough granted him under Notification No. 2125, of 18th May, 1883.

Mr. H. Moore is attached to the Conservator's Office *vice Mr. A. Watson*, Officiating Assistant Conservator, from 27th ultimo, the date of his assuming charge of his duties.

6.—BRITISH BURMAH GAZETTE—

Nil.

7.—ASSAM GAZETTE—

No. 178.—*The 4th June, 1885.*—The Chief Commissioner directs the publication for general information of the result of the Departmental Examination of Forest Officers, held on the 4th May, 1885, and following days :—

Mr. F. S. Barker, ... Bengali—Lower Standard.
„ *D. P. Copeland* ... Forest Law, Land Revenue.
„ *T. J. Campbell*, ... Forest Law, Land Revenue.

No. 203.—*The 18th June, 1885.*—*Mr. D. P. Copeland*, Assistant Conservator of Forests, made over charge of the Gáro Hills Forest Division, to *Mr. T. J. Campbell*, Assistant Conservator of Forests, on the forenoon of the 1st June, 1885, and took over charge of his special duty in connection with the construction of the Dambu road on the same date.

8.—MYSORE GAZETTE—

Nil.

9.—MADRAS GAZETTE—

Nil.

10.—BOMBAY GAZETTE—

No. 4163.—*The 23rd May, 1885.*—*Mr. S. Hornidge*, Assistant Conservator of Forests, 3rd grade, is allowed privilege leave of absence for three months from the 15th June, 1885, or such subsequent date as he may avail himself of it.

No. 4256.—*The 23rd May, 1885.*—His Excellency the Governor in Council is pleased to make the following appointments in the Forest Department, consequent on the departure on leave of *Mr. W. J. C. Dunbar*, Deputy Conservator of Forests, 4th grade :—

Mr. W. R. Woodrow, Assistant Conservator, 1st grade, to act as Deputy Conservator, 4th grade.

Mr. H. W. Keys, Assistant Conservator, 3rd grade, to act as Assistant Conservator, 1st grade.

Mr. B. J. Haselden, Sub-Assistant Conservator, 1st grade, to act as Assistant Conservator, 3rd grade.

Mr. Lakshman Ballál Oke to act as Sub-Assistant Conservator, 3rd grade.

The 13th June, 1885.—*Mr. B. J. Haselden*, Acting Assistant Conservator of Forests in charge Kánara Saw Mills, resumed charge of his office from *Mr. T. R. Bell*, Divisional Forest Officer, Central Division of Kánara, on the 4th June, 1885, before office hours.

The 22nd June, 1885 —*Mr. S. Hornidge, A.M.I.C.E.*, Assistant Conservator of Forests, 3rd grade, delivered over and *Mr. R. H. Maden*, Sub-Assistant Conservator of Forests, 3rd grade, received charge of the office of the Surat Forest Division on the 15th June, 1885, after office hours.

Mr. A. D. Wilkins, Assistant Conservator of Forests, 1st grade, delivered over and *Mr. G. M. Ryan*, Sub-Assistant Conservator of Forests, received charge of the Divisional Forest Office, North Thána, on the 16th June, 1885, before office hours.

The 23rd June, 1885.—*Mr. W. G. Clabby*, Sub-Assistant Conservator of Forests, delivered over and *Mr. W. J. C. Dunbar*, Deputy Conservator of Forests, received charge of the Divisional Forest Office, East Khándesh, on the 16th June, 1885, before office hours.

NOTICE.

A list has been received from the Manager of the Delhi and London Bank, Mussoorie, showing that many Subscribers to the 'Indian Forester' have not yet paid their subscriptions for Vol. X. As the cost of publication is barely covered by the amount of the subscriptions, it is hoped that these gentlemen will kindly send remittances without further delay, and a post card has now been sent to each of them as a reminder.

It is proposed to publish the names of Subscribers whose subscriptions are more than one year in arrears, and it is hoped that after due notice has here been given, that our supporters will not take offence at this necessary procedure.

Subscribers are also reminded that subscriptions for Vol. XI. are already due.